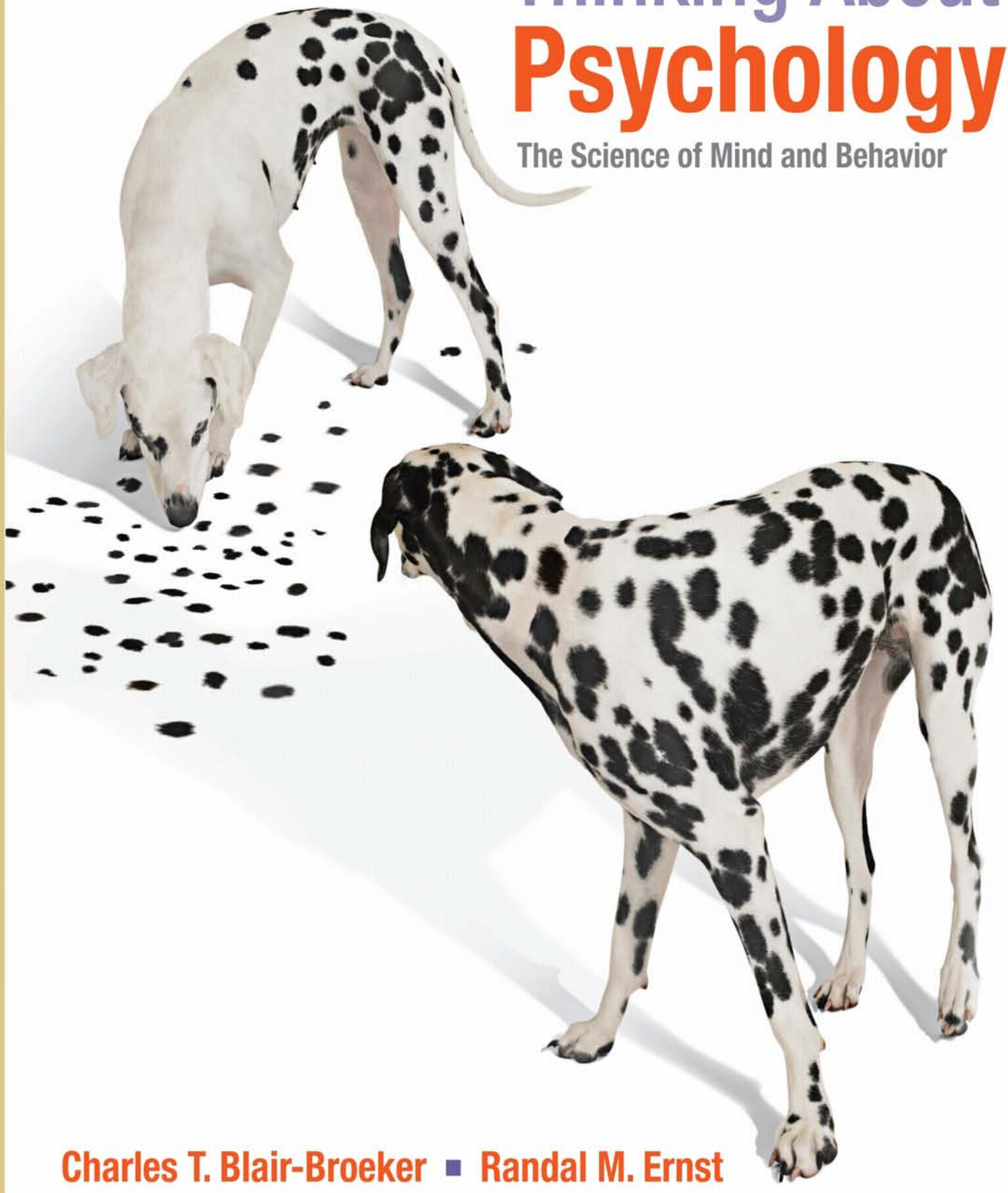
third edition

Thinking About Psychology

The Science of Mind and Behavior



Charles T. Blair-Broeker ■ Randal M. Ernst

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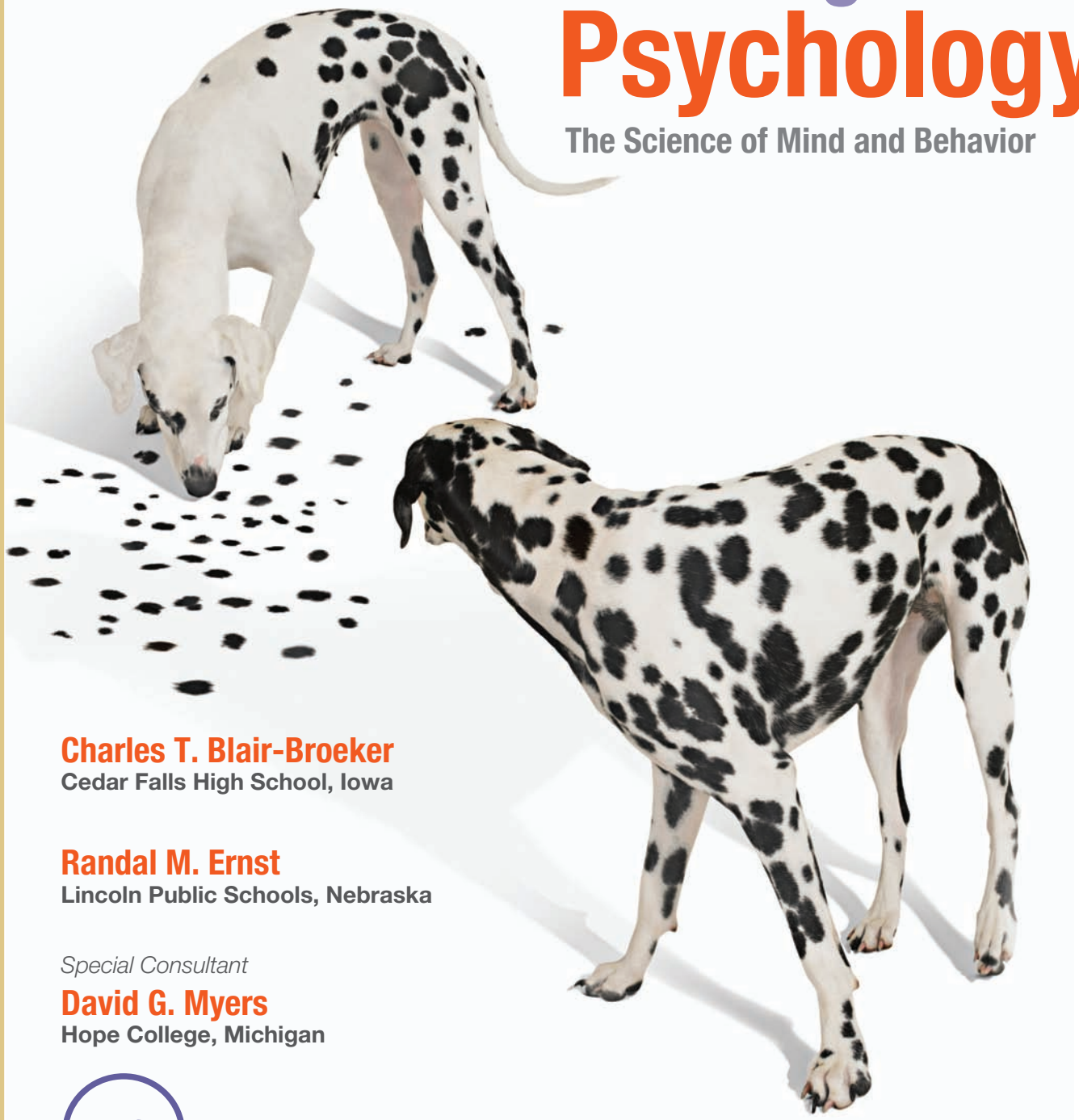

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To Ludy T. Benjamin, Jr., and David G. Myers

With admiration of your immeasurable impact on the teaching of psychology and gratitude for your unending support of the high school course.

ABOUT THE AUTHORS

Charles Blair-Broeker has taught psychology at Cedar Falls High School (Iowa) since 1978. He has been involved in a number of APA initiatives, serving as a member of the task force that authored the *National Standards for High School Psychology Curricula,* as chair of the executive board of Teachers of Psychology in Secondary Schools (TOPSS), and as co-editor of the fourth volume of the APA's *Activities Handbook for the Teaching of Psychology.* For three years, Charlie co-directed Teaching the Science of Psychology, a summer institute for high school psychology teachers supported by the National Science Foundation and the Northern Kentucky University Foundation. He has been a Question Leader, Rubric Writer, Table Leader, or Reader for Advanced Placement Psychology Examinations since the test was first administered in 1992, completed a three-year term on the AP Psychology Test Development Committee, and led many conferences on AP Psychology. He served on the steering committees for the American Psychological Association National Conference on Undergraduate Education in Psychology and the Psychology Partnerships Project. Among his teaching awards are the Grinnell College Outstanding Iowa Teacher Award, the University of Iowa Distinguished Teacher Award, and the APA Division 2 Teaching Excellence Award.

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. . . and special consultant

David Myers received his Ph.D. in psychology from the University of Iowa. He has spent his entire 30-year professional teaching career at Hope College, in Holland, Michigan, where he is the John Dirk Werkman Professor of Psychology. He has taught dozens of introductory psychology sections. Hope College students have invited him to be their commencement speaker and voted him "outstanding professor." His scientific articles have appeared in over two dozen scientific periodicals, including *Science, American Scientist,* and *American Psychologist,* and he has served on the editorial boards of the *Journal of Experimental Social Psychology* and the *Journal of Personality and Social Psychology.* In addition to his scholarly writing and his textbooks, *Myers' Psychology for AP*, Psychology, Psychology in Modules, Exploring Psychology, Exploring Psychology in Modules,* and *Social Psychology,* he has written about psychological science for general readers. His writings have appeared in more than two dozen magazines, from *Today's Education* to *Scientific American.* He has also published numerous trade books on subjects ranging from happiness to hearing loss.

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Dr. Amy Fineburg is the author of the Annotated Teacher's Edition and Teacher's Resource Materials for *Thinking About Psychology*. She is also the author of the teacher's edition for *Myers' Psychology for AP**. An award-winning teacher, Amy has chaired the TOPSS executive board, has served as a Reader then Table Leader at the AP Psychology Reading, and wrote the 2003 edition of the *Teacher's Guide for AP Psychology*. She has contributed numerous articles to AP Central, has been a consultant for the National Research Council, and led the past two revisions of high school psychology's National Standards. A coordinator for the National Institute for the Teaching of Biopsychology, Amy has written several book chapters promoting the teaching of positive psychology in high schools, the teaching of diversity issues, and use of the National Standards in all high school psychology classes. She currently serves as assistant principal for Oak Mountain High School, a 2011 National Blue Ribbon School.

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Kent Korek writes the PowerPoint lectures and contributes to the companion website for *Thinking About Psychology*. He has taught high school psychology since 1978 but may be best known for his work on the popular *Teaching High School Psychology* blog (teachinghighschoolpsychology.blogspot.com) and for his work with the Milwaukee Area Teachers of Psychology (MATOP) meeting, which he has coordinated since 1993. He is also an experienced AP Psychology teacher who has been active as a Reader, Table Leader, and most recently member of the Development Committee for AP Psychology. He is a College Board consultant and has facilitated and presented at many summer institutes.

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PREFACE

Thinking About Psychology is the only high school psychology textbook written *by* high school teachers *for* high school students. We were high school teachers long before we were authors and learned the hard way that good textbooks need to be much more than a compilation of factual information. Complex concepts must be clearly explained in straightforward language and illustrated with engaging examples to which students can relate. Part of what makes *Thinking About Psychology* a high-interest read for high school students is that our examples are geared toward our students, which means that they are geared toward yours as well. The highest professional compliment that we have ever received as authors was heard first from a reviewer and then from adopters of our first edition: "Charlie and Randy know high school psychology." This was exactly the reaction we had hoped for while writing *Thinking About Psychology*.

Teaching and learning about psychology is a wonderful adventure. The field rests on a foundation of research and critical thinking. Students master meaningful content, but they also learn thinking skills that help them navigate real-life problems. Our goal has been to provide our own foundation upon which teachers can build a successful course within any school's schedule. We wrote this book to serve as an ally for teachers striving to ignite a passion for psychology in their students. With tremendous support from colleagues and BFW Publishers, we think we have succeeded. Here is what we have to offer.

High School Insight

We've both been high school psychology teachers for many years and this experience gives us unique insight into what makes high school students tick. Several other experiences have broadened our understanding of the high school psychology world outside our own schools and districts. We

- participated in founding the APA's Teachers of Psychology in Secondary Schools (TOPSS), where Charlie was the first elected chair and Randy was the second.
- co-directed six month-long National Science Foundation summer institutes for high school psychology teachers.
- represented high school teachers at meetings of the APA's Board of Educational Affairs.
- lead dozens of five-day workshops on the teaching of AP Psychology in several countries.
- continue to be active in AP Psychology, having worked the AP Reading for 20 years, serving in multiple roles from Reader to Exam Leader.

We are also very fortunate to have the support of an outstanding team of high school psychology teachers and educators working with us as authors of our supplements program. In addition to serving as a sounding board and resource for us, they ensure that the needs of high school teachers and students are kept in mind throughout our entire teaching and learning package. More detailed information about the support package is included in the Annotated Teacher's Edition and on the catalog page: www.bfwpub.com/highschool/thinkingaboutpsych3e.

The Counsel of David G. Myers

Dave Myers continues to be a central figure in the development of our text. A psychology professor at Hope College in Holland, Michigan, Dave is the author of *Myers' Psychology for AP** and several best-selling college-level psychology textbooks. He is also the primary consultant on this project. Dave's review of nearly every page of the first edition helped us shape the direction of the book. We are immensely grateful for his support and ongoing contributions to this text.

Hallmark Features

Addresses the National Standards: *Thinking About Psychology* Stands Alone

The ***only*** psychology book organized around the 2011 version of the National Standards endorsed by the American Psychological Association (APA) and the National Council for Social Studies (NCSS), *Thinking About Psychology's* 36 modules align with the discipline's benchmarks and objectives unlike any other text.

Having served as co-authors of the National Standards, we thoroughly understand their content and

the philosophy behind them. We have also benefited from the insights of Amy Fineburg, chair of the 2011 Standards Revision Committee, who writes our Annotated Teacher's Edition and Teacher's Resource Materials. Our book allows easy incorporation of the Standards.

This text covers every Standard Area and provides support of the content in each area. Obtain a copy of the 2011 Standards by going to apa.org/education/k12/national-standards.aspx.

A Flexible Modular Approach

We present our content in 36 stand-alone modules that are organized according to the seven core domains of the Standards:

- Scientific Inquiry
- Biopsychology
- Development and Learning
- Sociocultural
- Cognition
- Individual Variations
- Applications of Psychological Science

The modules, which are shorter than the chapters found in other books, sustain student understanding and interest while providing more flexibility for structuring your course. Cover the whole book, or select the modules you'd like to cover, and then use them in any order that works for you. Student understanding of later modules never depends on the content of preceding modules.

A Teacher's Voice

One additional feature of our book that clearly distinguishes it from other texts is that we write from personal experience and in a first-person voice that brings the flavor of our classroom teaching into the text. Students and teachers alike tell us that this more familiar approach makes the material more interesting and accessible.

Content Changes in the Third Edition

We made significant changes to content in the third edition, reflecting both the wishes of those who reviewed the previous editions and our drive to keep up with the latest research. Briefly, these changes include the following.

New Focus on Positive Psychology in Application Boxes

Nineteen new Positive Psychology boxes contain information on topics as diverse as how to measure happiness, neurological research on resilience, optimism in adolescents, learning new habits, and encouraging heroism.

New Research Throughout

Old research references were dropped, and more than 400 new references were added to include up-to-the-minute information on topics such as mirror neurons, emotional intelligence, and the treatment of psychological disorders. See **Table 1** for details about the new material.

Thorough Coverage of Culture and Gender

The third edition of *Thinking About Psychology* continues its thorough coverage of culture and gender throughout the text. In addition to a new discussion of gender in Module 21, gender coverage is integrated throughout the text (see **Table 2**), providing interesting research findings about the psychology of men and women wherever possible. Module 21 also includes a discussion of individualism and collectivism, culture and personality, ethnocentrism, and cross-cultural psychology.

New Features in the Third Edition

We know the kinds of features that elevate a text from a compendium of facts to an effective teaching tool. We have also taken the time to listen to dozens of other teachers by way of focus groups, surveys, and manuscript reviews. Teacher input has helped us create an effective set of features.

For a visual walk-through of these exciting new features, and more, please see "Tools for Learning . . ." on pages xxii–xxv of this preface.

New Module Structure

Each module in the third edition has been streamlined and restructured. **What's the Point?** questions introduce each section to help orient students to the material they are about to read. **Pause Now**

Table 1

Detailed Content Changes in *Thinking About Psychology, 3e*

Module 1: History and Perspectives in Psychological Science
New figures on psychology's groundbreakers and on the historical development of psychology (pp. 12, 14)
New discussion of the effect of positive versus negative emotion on group productivity (p. 4)

Module 2: Research Strategies
Improved confounding variables figure (p. 33)
New discussion of operational definitions in positive psychology (p. 31)

Module 3: Psychology's Statistics
Additional examples to illustrate the importance of statistics in everyday life (pp. 42, 49, 52)

Module 4: The Nervous System and the Endocrine System
New anatomical figure art (pp. 63, 66, 69)

Module 5: The Brain
New research on glial cells (p. 85)
New discussion of brain plasticity (pp. 87–88)

Module 6: Sensation
New box on subliminal messages (p. 97)
New discussion of teens' ability to hear higher-pitched sounds (pp. 107–108)

Module 7: Perception
New research on infants' ability to use toy shadows to determine distance (p. 122)

Module 8: Sleep, Dreams, and Body Rhythms
New sleep statistics and sleep stage research (pp. 142, 146)

Module 9: Psychoactive Drugs
New alcohol and drug dependence statistics (pp. 158, 171)
New worldwide tobacco mortality statistics (p. 165)

Module 10: Hypnosis and Other States of Consciousness
New research on dual processing (p. 176)
New discussion of relaxation and meditation (pp. 184–185)

Module 11: Prenatal and Childhood Development
New research on brain development in preschoolers (p. 197)
Expanded discussion of emotional communication and attachment (pp. 205–207)

Module 12: Adolescence
New research on brain development in adolescence (p. 221)

Module 13: Adulthood and Aging
New research on aging and neural pathways (p. 236)
New research on emotion as we age (p. 243)

Module 14: Classical Conditioning
Expanded discussion of habitual behavior associations (p. 250)
New research on classically conditioned Little Albert (p. 259)

Module 15: Operant Conditioning
Expanded discussion of positive and negative punishment and reinforcement (pp. 266–288)

Module 16: Observational Learning
New observational learning figure (p. 292)
Expanded discussion of mirror neurons (pp. 292–293)

Module 17: Language Development
New discussion of building blocks similar to phonemes used in sign language (p. 299)

Module 18: Social Thinking and Social Influence
New discussion of encouraging heroism in everyday life (pp. 318–319)
Expanded discussion of minority influence (pp. 331–332)

Module 19: Social Relations
New discussion of online dating and speed dating (pp. 336–337)
New research on altruism (p. 344)
New research on the other-race effect (pp. 347–348)

Module 20: Nature and Nurture in Psychology
New research on parental and peer influence (pp. 365, 366–368)

Module 21: The Psychology of Culture and Gender
Expanded discussion of gender (pp. 380–383)
New table on collectivism and individualism (p. 374)

Module 22: Information Processing
Expanded discussion of automatic and effortful processing (pp. 391–393)
New research on the spacing of rehearsal and the effectiveness of self-testing (p. 394)

Module 23: Forgetting and Memory Construction
New research on eyewitness testimony and false memories in children (pp. 419–421)

Module 24: Thinking
New research on insight (p. 431)
Expanded discussion of the availability heuristic (p. 436)

Module 25: Intelligence and Intelligence Testing
New research on predicting college success (p. 442)
New discussion of the Flynn effect (p. 453)

Module 26: Motivation
Expanded discussion of the hierarchy of needs (pp. 468–469)
New research on neurotransmitters and hunger (pp. 472–473)

Module 27: Emotion
New discussion of the broaden-and-build theory of emotion (p. 484)
New research on brain structures associated with fear (p. 486)

Module 28: Psychodynamic and Humanistic Perspectives on Personality
New figure on the ideal versus actual self (p. 509)

Module 29: Trait and Social-Cognitive Perspectives on Personality
Expanded discussion of assessing personality via bedrooms, offices, and websites (p. 520)

Module 30: Introduction to Psychological Disorders
New table on risk and protective factors for mental disorders (p. 546)

Module 31: Anxiety and Mood Disorders
New research on anxiety disorders and quality of life (pp. 550–551)
New research on post-traumatic stress disorder in combat veterans (p. 556)
New statistics on depression and bipolar disorder (p. 561)

Module 32: Dissociative, Schizophrenic, and Personality Disorders
New research on delusions in schizophrenia (pp. 574–575)

Module 33: Psychological Therapies
Expanded discussion of virtual reality exposure therapy (p. 596)
New research on cognitive-behavioral therapy (pp. 601–602)

Module 34: Biomedical Therapies
New statistics on the use of antidepressants (pp. 612, 613–614)
New research on repetitive transcranial magnetic stimulation (p. 616)

Module 35: Effects of Stress
New statistics on the frequency of daily stress (p. 625)
New research on the benefits of stress and vulnerability to illness due to stress (p. 624–625)

Module 36: Promoting Wellness
New figure on achieving flow (p. 642)
New research on the benefits of exercise (pp. 635–637)

Table 2

Integrated Gender Coverage

The **psychology of men and women,** covered in Module 21, has also been integrated throughout the text.

Module 1: History and Perspectives in Psychological Science
Women in psychology, pp. 11–13 (Figure 1.2)

Module 4: The Nervous System and the Endocrine System
Hormones and sex glands, pp. 73–74

Module 5: The Brain
Limbic system and sexual function, p. 84

Module 9: Psychoactive Drugs
Gender differences in the effects of alcohol, p. 161

Module 11: Prenatal and Childhood Development
Smoking and pregnancy, p. 194
Alcohol and pregnancy, p. 194

Module 12: Adolescence
Physical development in adolescence, p. 216
Hormones and sex glands, p. 216
Cognitive factors on sexuality, p. 217
Cultural factors on sexuality, p. 217

Module 13: Adulthood and Aging
Menopause, p. 235
Women and work, p. 240
Marriage, pp. 241–242
Divorce, pp. 241–242
Midlife crisis, p. 235

Module 16: Observational Learning
Violence against women, p. 295

Module 19: Social Relations
Physical attractiveness, pp. 337–338
Prejudice, p. 345
Aggression and testosterone, p. 350

Module 23: Forgetting and Memory Construction
Sexual abuse and repressed memory, pp. 421–422

Module 25: Intelligence and Intelligence Testing
Gender differences and intelligence, pp. 453, 455

Module 26: Motivation
Eating disorders, pp. 474–475
Body image, p. 475

Module 27: Emotion
Gender differences in emotion, pp. 490–491
Interpreting body language, p. 490
Gender differences in emotion expression, p. 491 (Figure 27.8)

Module 28: Psychodynamic and Humanistic Perspectives on Personality
Freud's views, pp. 501–502, 505

Module 30: Introduction to Psychological Disorders
Prevalence rates for psychological disorders, p. 545

Module 31: Anxiety and Mood Disorders
Prevalence rates for depression, p. 564
Gender differences for suicide, p. 563 (Figure 31.5)

Module 32: Dissociative, Schizophrenic, and Personality Disorders
Prevalence rates of schizophrenia, p. 574

Module 35: Effects of Stress
Gender differences in stress and heart problems, p. 630

Module 36: Promoting Wellness
Gender factors in happiness, p. 642 (Table 36.1)
Discrimination and obesity, pp. 648

or Move On pointers conclude each section and encourage students' independent decision making. They can choose to turn to the summary material for that section to master it before moving on to the next, or they can read further.

- Each **What's the Point?** includes a learning goal question designed to preview section material while generating interest in the reader. These questions are restated and then answered in the section-specific review material at the end of each module.
- The section-specific **Apply What You Know** self-tests at the end of every module include a variety of assessment tools aimed at helping students master the essential material in each module, including multiple-choice, fill-in-the-blank, true-or-false, and short-answer questions. Answers to all questions are found at the back of the text in Appendix B so that students can evaluate their own understanding of topics.

Key People

To complement the **marginal glossary,** we have incorporated a new margin feature that highlights the contributions of key psychologists on the page on which the person is first introduced. For easy review, end-of-module lists of key terms and key people are referenced to the page on which the term or person was introduced. End-of-book glossaries in both English and Spanish include an alphabetized list with definitions of all the book's key terms and brief summaries of the contributions of key people.

Boxed Essays

Boxed essays throughout the text provide expanded coverage, motivate introspection, and encourage

scientific reasoning. All the boxes are listed in the full table of contents on pages x–xiii.

- The new **Thinking About Positive Psychology** boxes introduce students to the diverse range of topics to which the exciting field of positive psychology can and does contribute. Interesting subjects such as building resilience in military personnel and learning to lead capture student interest and offer practical personal application.
- **Psychology in the Real World** boxes help students apply psychological research to their everyday world. Topics include detecting lies, managing anger, groupthink, and many others.
- **Thinking Like a Psychological Scientist** boxes show how scientific methods are applied to psychological topics. Examples include closer looks at the brain and animal language.

Supplementary Materials

Interactive eBook

Our eBooks offer first-rate content, anytime access, and fully integrated media. Our highly effective study tools and personalization features for students include highlighting, note-taking, and more. What's more, teachers can easily customize the text to perfectly meet the course needs.

Book Companion Site

www.highschool.bfwpub.com/thinkingaboutpsychology3e

The site serves as a virtual study guide 24 hours a day, 7 days a week, while providing teachers with a variety of presentation, assessment, and course management tools. Student resources include module overviews, critical thinking exercises, demonstrations, interactive animations, quizzes, interactive flash cards, and web links for more information on specific topics.

The Brain Teaching Modules, Second Edition

Edited by Frank J. Vattano, Thomas L. Bennet, and Michelle Butler, all of Colorado State University, and created with Annenberg/CPB Multimedia, this collection of short clips provides vivid examples for myriad topics in introductory psychology. Individual segments range from 4 to 12 minutes in length and provide flexibility in highlighting specific topics. The clips are available online and on DVD through www.learner.org.

The Mind Teaching Modules, Second Edition

Edited by Frank J. Vattano of Colorado State University, with the consultation of Charles Brewer of Furman University and David Myers, in association with WNET, this collection of 34 short clips contains updated segments on language processing, infant cognitive development, heredity factors in alcoholism, and living without memory. The clips are available online and on DVD through www.learner.org.

Acknowledgments

We would never have completed any edition of this book without an amazing level of support from an amazing number of people. Books truly are a cooperative effort, and we are fortunate to be a part of such a skilled, dedicated group of individuals. First on this list is Catherine Woods, Worth's publisher, who makes everything happen. She is the model of competence, efficiency, insight, and good cheer.

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Last time, we expressed our appreciation and gratitude for outstanding teachers who mentored us long before this book was even a dream. The teachers mentioned included Don Davis, Mary Kay Reed, the late Cliff Fawl, and Perilou Goddard. We'd like to add some names to this list: Avon Crawford, an outstanding elementary teacher and motivator; Marvin Deitz, a truly great secondary science teacher; the late Leon Satterfield, a composition professor; Ken Keith, who combines kindness, competence, and humility in perfect amounts; Karen Stanley, who knows how to help teachers flourish; Charles Brewer, who teaches content in depth with impeccable style; Karen Reivich, a master teacher helping thousands of our soldiers be more resilient; and Marty Seligman, whose support of teaching and desire to improve the human condition are world renowned. However, without question, both of us owe the deepest debt of gratitude to Ludy T. "Ben" Benjamin, Jr., who brought us together for the first time at a Texas A&M summer teaching institute. Ben's support of high school psychology teachers is unmatched, and he opened countless doors of opportunity for the two of us. We also salute our teacher friends, colleagues, and the adopters we've never met, who share the joys and frustrations of our daily efforts to teach psychology.

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Your two authors have been friends for over 20 years. We have accomplished many things together—but none more satisfying than this book. We hope it helps spread interest in psychology among both teachers and students, and we welcome any and all feedback.

Charlie Blair-Broeker
Randy Ernst
www.highschool.bfwpub.com/
thinkingaboutpsychology3e

TOOLS FOR LEARNING . . .

Getting the Most From This Book

There are many interesting topics to study in psychology. To help you learn about the different areas in the field, we have organized the book into the seven **domains** recommended by the American Psychological Association, such as "Scientific Inquiry."

DOMAIN 1

Scientific Inquiry

- Thinking About Psychological Science
  - MODULE 1 History and Perspectives in Psychological Science
  - MODULE 2 Research Strategies
  - MODULE 3 Psychology's Statistics

We have divided the science of psychology into seven domains: (1) Scientific Inquiry, (2) Biopsychology, (3) Development and Learning, (4) Social Context, (5) Cognition, (6) Individual Variations, and (7) Applications of Psychological Science. Each broad domain covers at least one subject area, which is then broken into individual modules to examine specific topics in greater detail.

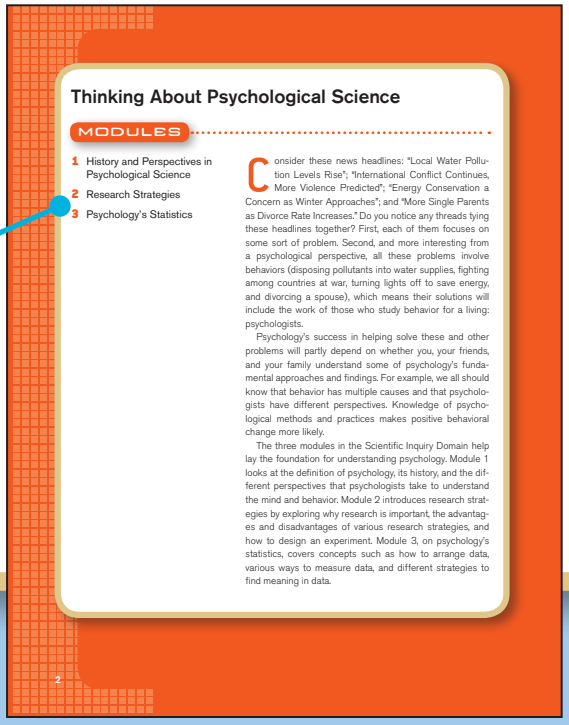
The first domain, Scientific Inquiry, has one subject area divided into three modules. These three modules are central to understanding the science of psychology and its emphasis on scientific research methods. You see, psychologists differ in their interests, but they all use the same research methods to explore behavior and mental processes. All modules, from 1 through 36, contain citations to many different studies, all of which used scientific research.

In addition to identifying the research methods by which psychologists examine behavior and mental processes, the Scientific Inquiry Domain contains modules that define *psychology*, discuss the history of psychology and different psychological perspectives, and examine how psychologists use statistics.

Each domain is designed with a different color so that you may easily determine which big idea you are studying. All the content in Domain 1 has an orange tab.

Read the text on the opening pages to get the big picture overview of the domain.

Each domain is broken into short, easy-to-read **modules,** outlined here, that relate to a specific theme, such as "Thinking About Psychological Science," as shown on page 2.



Thinking About Psychological Science

MODULES

1 History and Perspectives in Psychological Science
2 Research Strategies
3 Psychology's Statistics

Consider these news headlines: "Local Water Pollution Levels Rise"; "International Conflict Continues, More Violence Predicted"; "Energy Conservation a Concern as Winter Approaches"; and "More Single Parents as Divorce Rate Increases." Do you notice any threads tying these headlines together? First, each of them focuses on some sort of problem. Second, and more interesting from a psychological perspective, all these problems involve behaviors (disposing pollutants into water supplies, fighting among countries at war, turning lights off to save energy, and divorcing a spouse), which means their solutions will include the work of those who study behavior for a living: psychologists.

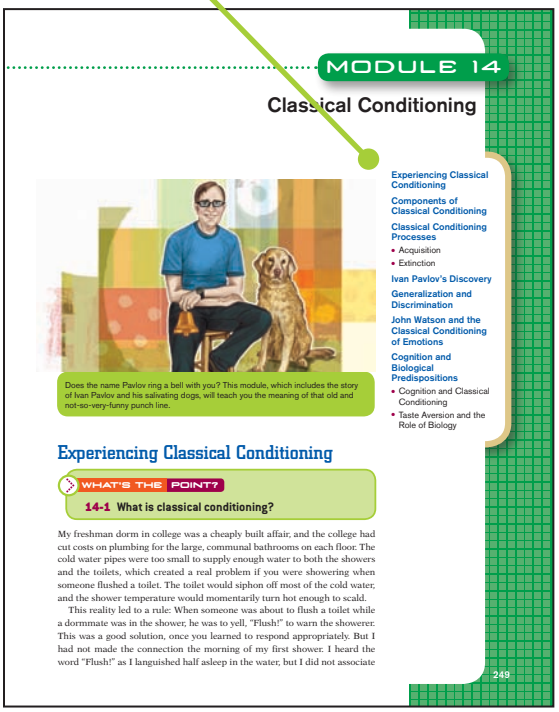
Psychology's success in helping solve these and other problems will partly depend on whether you, your friends, and your family understand some of psychology's fundamental approaches and findings. For example, we all should know that behavior has multiple causes and that psychologists have different perspectives. Knowledge of psychological methods and practices makes positive behavioral change more likely.

The three modules in the Scientific Inquiry Domain help lay the foundation for understanding psychology. Module 1 looks at the definition of psychology, its history, and the different perspectives that psychologists take to understand the mind and behavior. Module 2 introduces research strategies by exploring why research is important, the advantages and disadvantages of various research strategies, and how to design an experiment. Module 3, on psychology's statistics, covers concepts such as how to arrange data, various ways to measure data, and different strategies to find meaning in data.

2

Review the **outline** at the beginning of each module to preview the topics you will study.

Look at the **illustration** and read the **caption** to meet the author of the module and to get a snapshot of what you will learn.


MODULE 14

Classical Conditioning

Experiencing Classical Conditioning
Components of Classical Conditioning
Classical Conditioning Processes
- Acquisition
- Extinction

Ivan Pavlov's Discovery
Generalization and Discrimination
John Watson and the Classical Conditioning of Emotions
Cognition and Biological Predispositions
- Cognition and Classical Conditioning
- Taste Aversion and the Role of Biology

Does the name Pavlov ring a bell with you? This module, which includes the story of Ivan Pavlov and his salivating dogs, will teach you the meaning of that old and not-so-very-funny punch line.

Experiencing Classical Conditioning

WHAT'S THE POINT?

14-1 What is classical conditioning?

My freshman dorm in college was a cheaply built affair, and the college had cut costs on plumbing for the large, communal bathrooms on each floor. The cold water pipes were too small to supply enough water to both the showers and the toilets, which created a real problem if you were showering when someone flushed a toilet. The toilet would siphon off most of the cold water, and the shower temperature would momentarily turn hot enough to scald.

This reality led to a rule: When someone was about to flush a toilet while a dormmate was in the shower, he was to yell, "Flush!" to warn the showerer. This was a good solution, once you learned to respond appropriately. But I had not made the connection the morning of my first shower. I heard the word "Flush!" as I languished half asleep in the water, but I did not associate

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MODULE 19

Social Relations

Attraction
- Proximity
- Physical Attractiveness
- Similarity

Romantic Love
- Passionate Love
- Companionate Love

Altruism
Prejudice
- Ingroup-Outgroup: We and They
- Thought Processes and Prejudice

Aggression
- The Biology of Aggression
- Learning Aggression

Cooperation

Social networking makes it easy to connect with others, but good relationships with others depend on much more than the Internet.

Liking, loving, helping, hating, fighting, and befriending: We exhibit a wide range of behaviors in the way we relate to one another, all of which we consider in this module. As with so many areas of psychology, a complex combination of biological and environmental factors affects our social relations.

Attraction

WHAT'S THE POINT?

19-1 What factors influence attractiveness?

Who are your friends, and how did they become your friends? Does a person have to look a certain way, dress in a certain style, or listen to the same kind of music to be your friend? *Social psychologists* consider these and other

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To help keep on track with the reading, each numbered section in the module begins with a **WHAT'S THE POINT?** question, such as "What factors influence attractiveness?"

ing, and race relations. Birds of a feather do flock together. And the more alike you and your friends are, the longer you are likely to stay together (Byrne, 1971).

Similarity, physical attractiveness, and proximity all contribute to attraction, but there are other components to this feeling. One of them is our tendency to like people who like us. We respond positively and warmly to those who like us, which typically increases their affection and friendliness for us. Expressing friendship toward another increases our attractiveness. If you want a friend, be a friend.

PAUSE NOW OR MOVE ON

Turn to page 353 to review and apply what you've learned.

Check your comprehension of the section after you finish reading it by following the page reference in the **PAUSE NOW OR MOVE ON** box.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 19

Thinking About Social Relations

Attraction

WHAT'S THE POINT?

19-1 What factors influence attractiveness?

- Proximity is a major factor in attraction: The people we like, date, and even marry typically live near us.
- Appearance (physical attractiveness) is the first filter we use to sort the people we want to get to know from those we don't.
- Equity and self-disclosure are two important factors in developing and maintaining companionate love.

Apply What You Know

3. Which of the following types of love is more likely to be enduring?
   a. common-law love
   b. romantic love
   c. companionate love
   d. equitable love
4. Which of the following factors in a relationship are likely to help establish and maintain a companionate love relationship?
   a. equity and self-disclosure
   b. proximity and similarity
   c. superordinate goals and passionate love
   d. mere exposure effect and ingroup bias

Review what you have learned in the end-of-module **SUMMARY AND FORMATIVE ASSESSMENT.**

Each **WHAT'S THE POINT?** section question is followed by a bulleted summary and a few questions so that you may quiz yourself on how well you understand the material.

ingroup "Us"—people with whom we share a common identity.

outgroup "Them"—those perceived as different or apart from "us."

ingroup bias The tendency to favor our own group.

scapegoat theory The theory that prejudice offers an outlet for anger by providing someone to blame.

As you read the module, check the **marginal glossary** for definitions of key terms and look for the purple "bio boxes" and photos that introduce you to **key people** in psychology.

COURTESY OF JOHN DA

JOHN DARLEY (1938–)
Psychologist who, with Bibb Latané, researched the circumstances that determine when a bystander will intervene on behalf of another person.

When you finish reading the module, review the **KEY TERMS AND KEY PEOPLE** list in the summary.

KEY TERMS AND KEY PEOPLE

mere exposure effect, p. 336
passionate love, p. 339
companionate love, p. 340
equity, p. 340
self-disclosure, p. 340
altruism, p. 341
bystander effect, p. 342
prejudice, p. 344
stereotype, p. 344
discrimination, p. 344
ingroup, p. 346
outgroup, p. 346
ingroup bias, p. 346
scapegoat theory, p. 346
other-race effect, p. 347
just-world phenomenon, p. 348
aggression, p. 349
superordinate goals, p. 352
John Darley (1938–), p. 342
Bibb Latané (1937–), p. 342

Psychology in THE REAL WORLD

Are You Sleep Deprived?

Cornell University psychologist James Maas reports that most college students suffer the consequences of sleeping less than they should. To see if you are headed toward being in that group, answer the following true-false questions:

True	False	
_____	_____	1. I often need an alarm clock in order to wake up at the appropriate time.
_____	_____	2. It's often a struggle for me to get out of bed in the morning.
_____	_____	3. Weekday mornings I often hit the snooze bar several times.
_____	_____	4. I often feel tired and stressed out during the week.
_____	_____	5. I often feel moody and irritable; little things upset me.
_____	_____	6. I often have trouble concentrating and remembering.
_____	_____	7. I often feel slow with critical thinking, problem solving, and being creative.
_____	_____	8. I need caffeine to get going in the morning or make it through the afternoon.
_____	_____	9. I often wake up craving junk food, sugars, and carbohydrates.
_____	_____	10. I often fall asleep watching TV.
_____	_____	11. I often fall asleep in boring meetings or lectures or in warm rooms.
_____	_____	12. I often fall asleep after heavy meals.
_____	_____	13. I often fall asleep after dinner.
_____	_____	14. I often fall a minutes of g
_____	_____	15. I often feel
_____	_____	16. I often sleep weekends.
_____	_____	17. I often need the day.
_____	_____	18. I have dark
_____	_____	19. I fall asleep a movie.
_____	_____	20. I rely on ene the-counter me awake.

If you answered *True* to four or yourself seriously sleep deprive sleep needs, Maas recommends 15 minutes earlier than usual ev week—and continue this practic minutes each week—until you aw clock and feel alert all day." (Ma Questionnaire [MRAQ] adapted Maas & Robbins, 2010.)

Thinking Like a PSYCHOLOGICAL SCIENTIST

Animal Language

Do animals have language? I often sense that my golden retriever is trying to tell me something, and she often appears to understand what I tell her. Sometimes she even obeys! With enough time and effort, could we expand our communication into a full-fledged language?

Psychologists have been trying to answer this question for more than a century, most often with chimpanzees. In the 1930s, Winthrop and Luella Kellogg (1933) raised an infant chimpanzee, Gua, in their home, along with their son, Donald. They wondered whether the chimpanzee might develop language abilities if they raised it as a human. The Kelloggs did learn some interesting things from their work with Gua, but—despite eating in a high chair and wearing clothes like little Donald's—the chimpanzee never did learn to talk.

Maybe Gua didn't learn to talk because chimpanzees' vocal structure differs from that in humans. To get around this problem, later researchers, most notably Allen and Beatrix Gardner (1969), launched a project to teach chimpanzees American Sign Language (ASL), used by deaf humans. The Gardners' first student was the now-famous Washoe, who soon acquired a vocabulary of 132 signs. Roger Fouts, who, with Deborah Fouts, would later become the leading spokesperson for chimpanzees, was one of the Gardners' assistants in the late 1960s, charged with making baby Washoe's life "as stimulating and linguistic" as possible. In 1970, Washoe—and the research program that grew up around her—became Roger Fouts's primary responsibility. He and Deborah Fouts set up a program in which many of the people caring for Washoe and other chimpanzees were themselves deaf and whose first language was ASL. Washoe continued to thrive, and by the late 1990s she had increased her vocabulary to almost 200 signs (Sanz et al., 1998), where it remained until her death in 2007. She sometimes used amazing creativity to combine these signs to describe items. And perhaps most amazing of all, Washoe taught signs to Loulis, who picked up 55 signs while under her care. Here is a sample conversation between Loulis and his chimpanzee playmate, Dar (Fouts, 2003):

1. Loulis asked for a water balloon from Dar by holding his hand toward the balloon and signing, "Hurry, hurry."
2. When Dar moved away, Loulis signed, "Want."
3. When Dar moved away again, Loulis signed, "Hurry, hurry. Gimme."
4. Dar gave the balloon to Loulis, and the two chimpanzees separated.

Nobody doubts that these accomplishments are remarkable. The key question is, do they constitute language? The answer depends on how you define *language*. Even with a loose definition, psychologists are skeptical that any chimpanzee's communication skills can come close to matching those of a young human. One trained chimpanzee used 16 signs to ask for an orange: "Give orange me give eat orange me eat orange give me eat orange give me you" (Jolly, 1985). The idea comes across, but hardly with the type of efficiency one would hope for. A great deal of effort produces limited results with chimpanzees, whereas humans master language almost effortlessly. As amazing as these communicating chimpanzees are, their very limitations help illustrate how astounding human language ability is.

Washoe

Washoe could communicate with humans (and other chimpanzees) using a vocabulary of nearly 200 signs.

© FRIENDS OF WASHOE

Thinking About POSITIVE PSYCHOLOGY

Nurturing Happiness

On many occasions, my grandmother said, "Nobody is born happy." She meant this both literally and figuratively. Literally, it's a good sign if a newborn baby has a loud, healthy cry upon birth. Figuratively, she was saying that you shouldn't wait for happiness to come to you. Rather, you should try to figure out things you can do to help make your life happier.

Science and positive psychologists agree with my grandmother: There are many simple things you can do to nurture happiness. Happiness and other positive emotions are increased when you

- express gratitude to others for things they have done to help you.
- challenge discouraging thoughts about the past.
- savor the good things in life (for example, a good grade on a test, sunsets, a tasty treat, or your favorite song) that we often take for granted (Seligman et al., 2005).

Martin Seligman has used what he calls the "good things in life" exercise as a savoring intervention to improve happiness. The exercise is designed to increase positive emotion about the recent past. To do this, he asks individuals to

1. record, every day for a week, three good things that happened.
2. also record why those good things occurred.
3. share those good things with a friend or family member.

Could nurturing happiness be just that simple? The answer is a clear *Yes*. After completing this exercise, Seligman found that participants, compared to control groups, scored higher on tests to measure happiness and were also happier and less depressed at a three-month follow-up.

Seligman points out that positive psychology is not meant to imply that there is a negative psychology. Promoting happiness, positive emotions, and well-being is in part an attempt to promote a *balanced* psychology. He writes, "We are committed to a psychology that concerns itself with repairing weakness (for example, therapy) as well as nurturing strengths—a psychology that concerns itself with remedying deficits as well as promoting excellence" (Seligman, 2008).

Dig a little deeper into psychology by reading the special boxed content that is sprinkled throughout the book.

DOMAIN 1

Scientific Inquiry

Thinking About Psychological Science

MODULE 1 History and Perspectives in Psychological Science

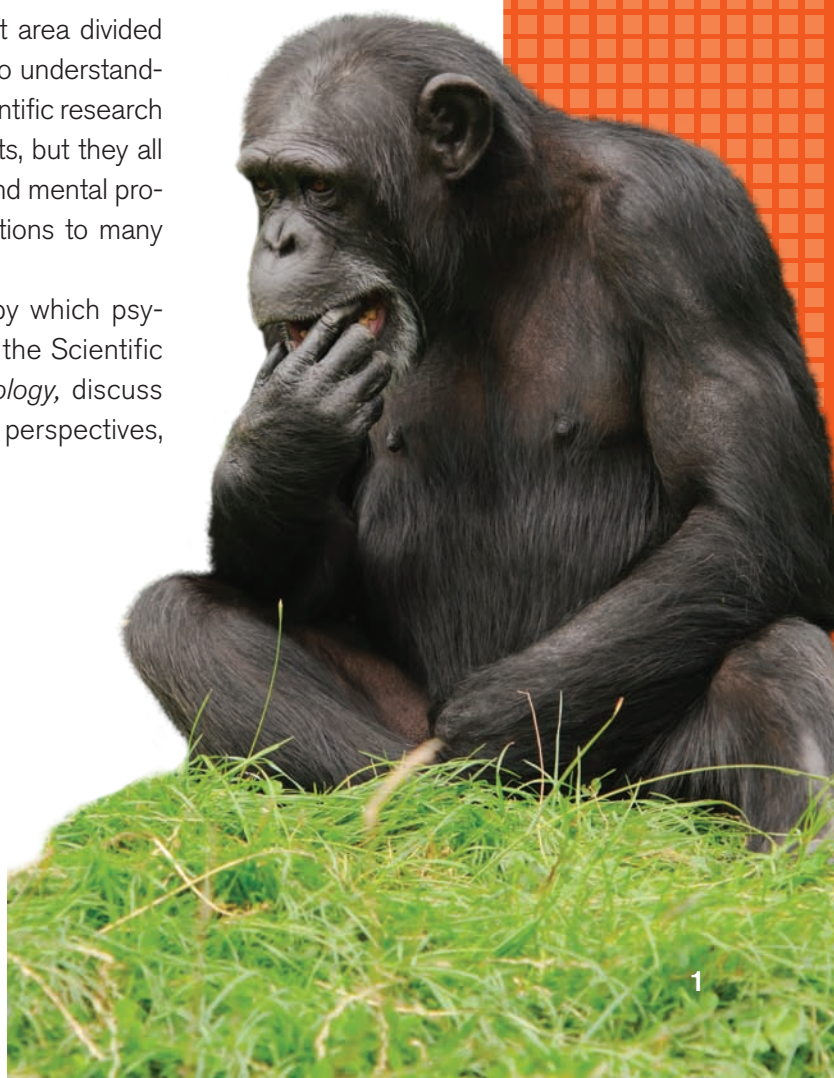
MODULE 2 Research Strategies

MODULE 3 Psychology's Statistics

We have divided the science of psychology into seven domains: (1) Scientific Inquiry, (2) Biopsychology, (3) Development and Learning, (4) Sociocultural, (5) Cognition, (6) Individual Variations, and (7) Applications of Psychological Science. Each broad domain covers at least one subject area, which is then broken into individual modules to examine specific topics in greater detail.

The first domain, Scientific Inquiry, has one subject area divided into three modules. These three modules are central to understanding the science of psychology and its emphasis on scientific research methods. You see, psychologists differ in their interests, but they all use the same research methods to explore behavior and mental processes. All modules, from 1 through 36, contain citations to many different studies, all of which used scientific research.

In addition to identifying the research methods by which psychologists examine behavior and mental processes, the Scientific Inquiry Domain contains modules that define *psychology,* discuss the history of psychology and different psychological perspectives, and examine how psychologists use statistics.



Thinking About Psychological Science

MODULES

1 History and Perspectives in Psychological Science

2 Research Strategies

3 Psychology's Statistics

Consider these news headlines: "Local Water Pollution Levels Rise"; "International Conflict Continues, More Violence Predicted"; "Energy Conservation a Concern as Winter Approaches"; and "More Single Parents as Divorce Rate Increases." Do you notice any threads tying these headlines together? First, each of them focuses on some sort of problem. Second, and more interesting from a psychological perspective, all these problems involve behaviors (disposing pollutants into water supplies, fighting among countries at war, turning lights off to save energy, and divorcing a spouse), which means their solutions will include the work of those who study behavior for a living: psychologists.

Psychology's success in helping solve these and other problems will partly depend on whether you, your friends, and your family understand some of psychology's fundamental approaches and findings. For example, we all should know that behavior has multiple causes and that psychologists have different perspectives. Knowledge of psychological methods and practices makes positive behavioral change more likely.

The three modules in the Scientific Inquiry Domain help lay the foundation for understanding psychology. Module 1 looks at the definition of psychology, its history, and the different perspectives that psychologists take to understand the mind and behavior. Module 2 introduces research strategies by exploring why research is important, the advantages and disadvantages of various research strategies, and how to design an experiment. Module 3, on psychology's statistics, covers concepts such as how to arrange data, various ways to measure data, and different strategies to find meaning in data.

MODULE 1

History and Perspectives in Psychological Science

This psychogram would never be used by today's psychologists, but it illustrates psychology's interesting history.

An unusually large group of students collects in the hallway during the 5-minute break between class periods. Some stand on tiptoe, craning their necks from side to side, attempting to gain better views of the two students shouting at each other 10 feet from my classroom door. The tardy bell does little to disperse them.

The crowd swells in number, making it nearly impossible to identify who is at the center of this argument. An assistant principal intervenes, and the escalating shouting match ends as quickly as it started. Both students are escorted to the office to sort out their differences.

Fortunately, these disruptions are rare where I teach, but talk of the dispute, which started as a vote on homecoming themes in a student council meeting, buzzes from desk to desk. So, we begin class by discussing some questions that psychologists might pose about the incident we just witnessed:

- Are some of us born more aggressive than others?
- How are levels of aggression affected by what we learn from our parents, peers, and cultural groups?

The Definition of Psychology

Modern Psychology's Roots

- Wilhelm Wundt and the Beginning of Psychology as a Science
- Edward B. Titchener and Structuralism
- Gestalt Psychology
- William James and Functionalism

Psychology in the Twentieth Century

- Sigmund Freud and Psychoanalysis
- Ivan Pavlov, John Watson, and Behaviorism
- Abraham Maslow, Carl Rogers, and Humanistic Psychology
- Jean Piaget and Child Development

Psychology's American Groundbreakers

Six Psychological Perspectives

Psychology in the Twenty-First Century

- What are the biological influences on aggression?
- What motivates some people to settle their differences physically and others to talk them out?
- Are young adults more likely than middle-aged adults to take part in physical confrontations?
- How could this situation have been avoided or defused?
- Why were students more likely to watch this conflict (and be late to class) than to break it up?
- Why do some groups or committees get along better than others? (See Thinking About Positive Psychology: Getting Along—The Math Behind Groups That Thrive.)

This psychology course will help you answer these and many other interesting questions.

Thinking About POSITIVE PSYCHOLOGY

Getting Along—The Math Behind Groups That Thrive

One day, if you haven't already, you'll be a part of a committee or group that meets regularly in your high school, the college you attend, or your community. Whether a student council, a church youth group, or the Spanish club, group members must get along to agree on and accomplish goals.

Psychologists have asked, "What helps groups get along and thrive?" It turns out that there is an emotional recipe for cooking up healthy group outcomes. The number of positive emotions experienced during meetings (compared to negative emotions) has a big impact on a group's flourishing and productivity (Fredrickson & Losada, 2005). Using scientific methods and mathematics, the positivity-negativity ratio should at least be 3 to 1, and perhaps as high as 11 to 1.

This is not to say that there should be no debate on topics that need resolving. However, research shows that boards and committees with positivity-negativity ratios below 3 to 1 often have a "toxic atmosphere," and productivity from such group members is rare (Fredrickson et al., 2005).

So, let's say you want to pump up the positivity-negativity ratio during your next yearbook staff gathering or student council meeting. What should you do? Research suggests that you should

- promote undivided focus as each group member speaks. (Outlaw texting during meetings!)
- express appropriate support, encouragement, or appreciation during and after a group member's presentation.
- ask questions that explore a speaker's viewpoint instead of making statements like "That will never work."
- minimize sarcastic and cynical comments.
- discourage nonverbal behaviors (for example, eye rolling and smirking) during meetings.

Hopefully, the positive-negative ratio idea will spill over into other aspects of your life. Interestingly enough, unsuccessful business teams, feelings of depression, and failing marriages are also characterized by very low ratios of positive to negative emotions (Waugh & Fredrickson, 2006).is

The Definition of Psychology

psychology Scientific study of behavior and mental processes.

basic research Pure science that aims to increase the scientific knowledge base.

applied research Scientific study that aims to solve practical problems.

WHAT'S THE POINT?

1-1 What is psychology, and what kinds of topics do psychologists study?

Psychology is the scientific study of behavior and mental processes. Before going any further, let's make sure we understand the three parts of this definition: scientific study, behavior, and mental processes.

When we say that psychology is a *scientific study,* we mean that psychologists rely on scientific research methods in their attempts to unravel answers to questions such as "Why do some people offer help when others do not?" Psychologists systematically collect research data and use mathematical formulas to analyze the results. Scientific research methods are an essential key to unlocking psychology's secrets.

The last two parts of our definition, *behavior* and *mental processes,* establish the incredibly broad range of interesting topics that psychologists study. Any directly observable thing you do, from laughing to turning the pages of this book, is a behavior that psychologists could study. But psychologists also study the things we cannot observe directly—our mental processes, which include all our thoughts, feelings, and dreams.

Are some people simply born more aggressive than others? To find out, psychologists might study children in a day care by watching for aggressive behaviors at early ages. Psychologists might also study the parts of the brain that are active during aggressive behavior to try to determine what chemicals affect this region of the brain. Psychologists who are less biologically inclined might examine a person's home life in search of the origins of aggressive acts. Interestingly, psychologists also study people who witness aggressive behavior, trying to understand why some people offer help and try to stop the aggression while others are apathetic and do not.

Psychologists who do research on such topics do so with different goals in mind. Some conduct **basic research,** which is research done to increase the scientific knowledge base of psychology. Others conduct **applied research,** which is research intended to solve practical problems. Basic research on aggressive behavior might aim to find out more about the biological influences on aggression. Applied research on helping behaviors might aim to reduce apathy in bystanders who witness aggressive behavior.

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What Makes You Smile?

Psychologists use scientific methods to study topics such as happiness, love, and friendship.

Fascinating subjects such as aggression against others, apathy toward helping, gratitude, altruism, and the development of children as they grow into adolescents and young adults are examined in this textbook. The psychologists studying these concepts chose one of the many careers (see Appendix A: Careers in Psychology) available to those who decide to pursue psychology as an occupation.

PAUSE NOW OR MOVE ON

Turn to page 17 to review and apply what you've learned.

Modern Psychology's Roots

WHAT'S THE POINT?

1-2 How did the study of psychology as a science get started?

We humans have probably been curious about ourselves and the world around us for as long as we have been around. But the history of modern psychology represents less than a century and a half's work. Most other sciences are much older than psychology.

Wilhelm Wundt and the Beginning of Psychology as a Science

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WILHELM WUNDT [VOONT] (1832–1920)
Founder of modern psychology; he opened the first psychology laboratory.

Psychology's earliest pioneers shared a keen interest in understanding mental processes and, later, behavior. One of these early pioneers was German philosopher and physiologist **Wilhelm Wundt** (pronounced VOONT). As a youngster, Wundt was an unlikely candidate for the founder of a new science. The son of a Lutheran minister, Wundt had trouble concentrating in school, often received bad grades, and even had to repeat a grade. But the future "father" of psychology found his academic groove and eventually graduated from medical school. Wundt wasn't that interested in practicing medicine, however; he wanted to understand human consciousness. So, he began conducting experiments that tested how perceptions, sensations, and feelings related to human behavior. Wundt was given laboratory space at the University of Leipzig to run his psychological experiments in 1879, which is now recognized as the "birth year" of psychology.

Wundt's attempts to understand human consciousness used a process called *introspection*. Students trained in the introspection method were taught to describe their own conscious experiences in a systematic way. Each student received the same sound or visual experience, and then Wundt used their detailed descriptions as a foundation for understanding consciousness.

Reducing consciousness to its basic elements was generally at the heart of Wundt's research.

One reason Wundt is considered the founder of modern psychology was his use of experimental methods to study consciousness. For example, in one study participants were told to press a button as soon as they saw a light come on. This was called Task 1. The time it took them to respond was recorded. Next, participants were told that either a red or a green light would come on. Their instructions were to press the left-hand button if the light was green and the right-hand button if the light was red. This was called Task 2. Again, the time to respond was recorded. Task 1 required only perception of a light before responding, but Task 2 required perception of the light, a decision about which color was shown, and a second decision about whether to push the left button or the right button. The time needed to respond to Task 2 was longer than that for Task 1, and Wundt believed the time difference between tasks measured the speed of mental processes.

Edward B. Titchener and Structuralism

One of Wundt's students, **Edward B. Titchener,** introduced **structuralism,** the first major school of thought in psychology. Just as a chemist tries to understand the different elements in chemical compounds, structuralists tried to understand the *structure* of conscious experience by analyzing the intensity, clarity, and quality of its basic parts. For example, picture a blade of grass. A structuralist might have lingered over the intensity of the green color of the blade of grass, the clarity of its texture, and the roughly rectangular shape of the blade. For Titchener and his students, successful descriptions of such basic elements were the building blocks of consciousness. Like Wundt, Titchener studied the structural elements of consciousness. Unlike Wundt, Titchener did not want to use hypothetical mental processes to explain consciousness. Instead, Titchener steered psychology toward a descriptive science he could see.

ARCHIVES OF THE HISTORY OF AMERICAN PSYCHOLOGY, THE UNIVERSITY OF AKRON

EDWARD B. TITCHENER (1867–1927) Founder of structuralism.

Gestalt Psychology

Ultimately, structuralism did not produce many followers, and so it died out. One reason for this was that in practice it didn't prove to be very reliable. Perhaps the greatest contribution structuralism made to psychology is that it provided a theory for others to disprove, giving rise to other schools of thought in psychology.

Gestalt (a German word that means "configuration" and is pronounced gih-SHTALT) **psychology** was a psychological perspective that emphasized our tendency to integrate pieces of information into meaningful wholes. Opposed to merely analyzing the elements of consciousness, Gestalt psychologists suggested that adding the individual elements of an experience together creates something new and different—that *the whole is different from the sum of its parts* (see **Figure 1.1**). For example, think of the notes to your

structuralism Theory that the structure of conscious experience could be understood by analyzing the basic elements of thoughts and sensations.

Gestalt [gih-SHTALT] psychology Psychological perspective that emphasized our tendency to integrate pieces of information into meaningful wholes.

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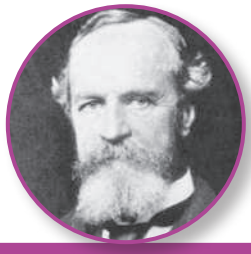
Figure 1.1
The Gestalt of Sound

In Gestalt theory, the whole (in this case, the collective notes of a song) is different from the individual parts (that is, the notes).

favorite song. Individually, each note means little, but put them together and you have a great tune. Combining the elements, then, creates something that did not exist before. Most prominent Gestalt psychologists fled Nazi Germany in the 1930s, but their work resurfaced in new psychological theories later in the century.

William James and Functionalism

Another psychologist who disagreed with the structuralist approach was Harvard University professor **William James.** James, the first American psychologist, once noted that the first psychology lecture he ever heard was his own. He went on to write the first psychology textbook, published in 1890, which influenced thousands of students over the next several decades. For James, psychology needed to study the *functions* of consciousness, or the ways consciousness helps people adapt to their environment, a view that became known as **functionalism.** James was influenced by Charles Darwin's theory of evolution and believed that mental processes evolved over time. James thought that we developed useful habits—such as washing our hands before eating or brushing our teeth after a meal—because they help us function more effectively in our daily lives. That is, washing our hands keeps us from eating germs and becoming sick, and brushing our teeth keeps them from falling out. James's idea was that consciousness helped us adapt to and function in our surroundings, and he thought that understanding this idea should be the goal of psychology.



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WILLIAM JAMES (1842–1910) First American psychologist and author of the first psychology textbook.

PAUSE NOW OR MOVE ON

Turn to page 18 to review and apply what you've learned.

Psychology in the Twentieth Century

WHAT'S THE POINT?

1-3 In what ways did twentieth-century psychologists change how psychology was studied?

As the 1900s began, the science of psychology was heading in new directions. Perhaps the most influential figure of this time was a man whose name you have likely heard associated with psychology, Sigmund Freud.

functionalism Theory that emphasized the functions of consciousness or the ways consciousness helps people adapt to their environment.

Sigmund Freud and Psychoanalysis

psychoanalysis Freud's theory of personality; also, a therapeutic technique that attempts to provide insight into thoughts and actions by exposing and interpreting the underlying unconscious motives and conflicts.

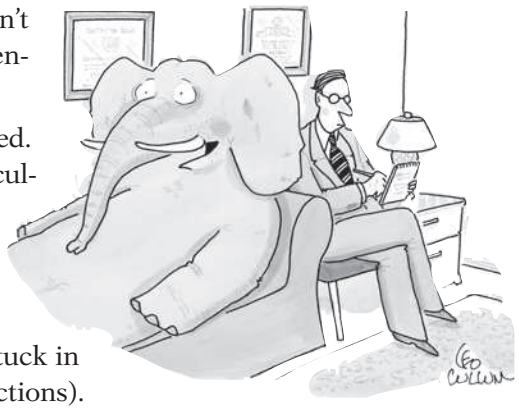
Few outside psychology have heard of structuralism and functionalism, but almost everyone has heard of the Austrian physician **Sigmund Freud.** In 1900, Freud introduced the world to **psychoanalysis,** a theory of personality and therapeutic technique that attributes our thoughts and actions to unconscious motives and conflict. For example, a child who is afraid to express anger toward a parent might draw on the parent's newly painted bedroom walls or embark on some other destructive behavior.

The stereotypical image of a therapist comes from pop culture notions surrounding Freud, which countless cartoons have poked fun at over the years. Freud's approach to psychology differed from Titchener's structuralism and James's functionalism in two key ways:

1. Psychoanalysis focused on abnormal behavior, which Freud attributed to unconscious drives and conflicts, often stemming from childhood. For instance, Freud thought that a conflict experienced in childhood, such as a difficult time in potty training, could reappear for that person as an obsession for order and cleanliness later in life.
2. Psychoanalysis relied on personal observation and reflection instead of controlled laboratory experimentation as its means of discovery. While Freud claimed his work was scientific, it really wasn't because he relied on self-reported reflections rather than scientific methods to gather information.

SIGMUND FREUD (1856–1939) Founder of psychoanalysis, a controversial theory about the workings of the unconscious mind.

KEYSTONE PICTURES USA/ALAMY



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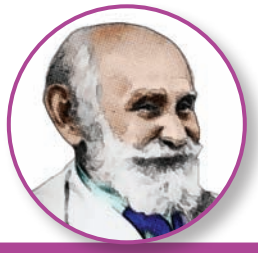
"I'm right there in the room, and no one even acknowledges me."

Freud died in 1939, and many of his ideas have since been disproved. However, elements of Freud's original theory are still part of pop culture. A "Freudian slip," for example, is a misstatement reflective of something you'd *like* to say. "Do you want to study for tomorrow's kizz?" a boy might stammer to the girl of his dreams. The term "anal retentive" comes from one of Freud's developmental stages and refers to someone who is excessively neat, clean, and compulsive (stuck in the "anal stage," where we supposedly come to terms with bodily functions). Freud's greater legacy, however, was his novel approach to understanding behavior, and some of these ideas have been incorporated into *psychodynamic theory,* which is a modernized version of Freud's original theories (and is discussed in more detail later in this module). Psychologists influenced by psychodynamic theory still assume, as Freud did, that our unconscious thoughts, inner conflicts, and childhood experiences significantly affect our personality and behaviors.

Ivan Pavlov, John Watson, and Behaviorism

In 1906, the classic studies on animal learning of Russian physiologist **Ivan Pavlov** fueled a move in psychology toward an interest in *observable* behaviors and away from the self-examination of inner ideas and experiences. Pavlov's emphasis on things we can see (rather than mental processes) quickly caught on in the United States. Consider the following, which appeared in *Psychological Review* seven years after Pavlov first published his work and



IVAN PAVLOV (1849–1936) Russian physiologist and learning theorist famous for the discovery of *classical conditioning,* in which learning occurs through association.

SOVFOTO

behaviorism The theory that psychology should only study observable behaviors, not mental processes.

humanistic psychology A perspective that focuses on the study of conscious experience, the individual's freedom to choose, and the individual's capacity for personal growth.

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JOHN B. WATSON (1878–1958) Founder of behaviorism, the theory that psychology should restrict its efforts to studying observable behaviors, not mental processes.

BACHRACH/GETTY IMAGES

B. F. SKINNER (1904–1990) American behavioral psychologist who developed the fundamental principles and techniques of *operant conditioning* and devised ways to apply them in the real world.

struck a nerve in the world of psychology: "Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of human behavior" (Watson, 1913). It can be argued that the words in this article sent the study of mental processes into hibernation for the next 40 years.

John B. Watson, the author of this article that encouraged psychologists to dismiss the study of consciousness, considered structuralism and functionalism failures, given his belief that the methods of these perspectives were unscientific. He wanted psychology to move in a more experimental direction, and to that end he launched **behaviorism,** the theory that psychology should only study observable behaviors, not mental processes. Watson's work made psychology more objective and scientific in its methods, although most behaviorists today recognize the significance of studying both mental processes and behaviors.

Watson's behaviorism was the most dominant school of thought in psychology in the twentieth century, and he promoted the study of learned reflexes originally developed by Pavlov. This method included precise experimental observations of human reactions to various stimuli. His most famous study paired the presentation of a furry, white object to an infant along with the presentation of a loud noise. The loud noise frightened the infant, but pairing a furry, white object with the loud noise also led the child to fear furry, white objects. Later, the sight of something like a white rabbit would lead to uncontrollable crying by the infant.

In the years since, this school of thought has been modified somewhat by other behaviorists, such as **B. F. Skinner.** Today, behaviorism focuses on learning through rewards and observation, and studies that include frightening small children would neither be approved by a research review panel nor be conducted by any ethical psychologist.

Abraham Maslow, Carl Rogers, and Humanistic Psychology

Behaviorism and psychoanalysis maintained their hold on the field into the 1960s, when a "third force" began to influence psychology (Schultz & Schultz, 2008). **Humanistic psychology,** led by **Abraham Maslow** and **Carl Rogers,** rejected the idea that humans are controlled by a series of rewards and reinforcements. Instead, they emphasized *conscious experience* as the proper focus of psychology. They also believed that humans have free will in their decision making and that healthy people strive to reach their full potential. Furthermore, humanistic psychologists did not believe that humans could be reduced to various parts and pieces. That is, an entire human—the whole person—is different from the sum of all the parts (brain, neurons, emotions, and so on). Does this remind you of an older school of thought? Yes, the humanistic psychologists were influenced by the Gestalt psychologists who preceded them.

Humanistic psychology showed great promise early in its existence, but many believe its subsequent decline resulted from the lack of scientific research to back up its proposals (Seligman & Csikszentmihalyi, 2000). The

MICHAEL ROUGIER/TIME & LIFE PICTURES/GETTY IMAGES

CARL ROGERS (1902–1987) Humanistic psychologist who developed *client-centered therapy* and stressed the importance of acceptance, genuineness, and empathy in fostering human growth.

THE GRANGER COLLECTION, NEW YORK/
THE GRANGER COLLECTION

ABRAHAM MASLOW (1908–1970) Humanistic psychologist who proposed the *hierarchy of needs*, with *self-actualization* as one of the ultimate psychological needs.

idea of striving to reach one's potential, proposed by Maslow 40 years ago, has been picked up by the *positive psychologists* of the twenty-first century, as you will see later in this module.

Jean Piaget and Child Development

Swiss biologist and psychologist **Jean Piaget** (pronounced pee-ah-ZHAY) is another pioneer; he is best known for his work on how children develop their thinking abilities. His early work focused on biology, but after moving to France in the 1920s, his interest turned to psychology. When he began teaching in a school known for administering intelligence tests, Piaget noticed an interesting phenomenon: Students of a certain age consistently made mistakes on the tests that older children did not make. This led Piaget to believe that younger children thought differently than older children. Piaget published more than 60 books over the next 50 years that most often dealt with how thinking develops in children.

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JEAN PIAGET [pee-ah-ZHAY] (1896–1980) Pioneer in the study of developmental psychology who introduced a stage theory of cognitive development that led to a better understanding of children's thought processes.

PAUSE NOW OR MOVE ON

Turn to page 18 to review and apply what you've learned.

Psychology's American Groundbreakers

WHAT'S THE POINT?

1-4 How did psychology's groundbreakers move psychology forward and help advance gender and race equality?

Like other academic fields, early psychology lacked the ethnic and gender diversity it has today. Although difficult to imagine by today's standards, women and minority students were often discouraged from attending colleges

and universities at the time of and for decades after psychology's birth. If this seems shocking, remember, for example, that women were not allowed to vote in the United States until 1920. The spirit of the times in North America and in Europe (where psychology flourished) favored the advancement of white men at the expense of nonwhite men and all women. These racial and gender barriers meant white males dominated psychology (and all sciences) because others rarely had the opportunity to gain the education, knowledge, and training necessary to become a psychologist. Several groundbreakers in psychology excelled in, and in spite of, this hostile cultural climate (see **Figure 1.2**).

G. Stanley Hall was a student of Wundt's who achieved a number of psychological firsts. Hall was the first American to receive a doctoral degree

Figure 1.2
Psychology's Groundbreakers

CORBIS
G. Stanley Hall
(1844–1924)

COURTESY OF THE NATIONAL LIBRARY OF MEDICINE
Alfred Binet
(1857–1911)

Karen Horney
(1885–1952)

COURTESY ALBERT BANDURA, STANFORD UNIVERSITY
Albert Bandura
(1925–)

111/HOLLANDSE HOOGTE/REDUX
Martin Seligman
(1942–)

1879 Wilhelm Wundt opens the first psychology laboratory in Leipzig, Germany.

1890 William James publishes the first psychology textbook, *Principles of Psychology*.

1892 G. Stanley Hall founds the American Psychological Association (APA). E. B. Titchener introduces structuralism.

1900 Sigmund Freud publishes his psychoanalytic views in *The Interpretation of Dreams.*

1905 Mary Whiton Calkins becomes the first woman to be president of the APA. Alfred Binet develops the first intelligence test.

1906 Ivan Pavlov publishes his results on learning by association.

1908 Margaret Floy Washburn becomes the first woman to receive a doctoral degree (Ph.D.) in psychology.

1913 John B. Watson publishes "Psychology as the Behaviorist Views It."

1920 Francis Cecil Sumner becomes the first African-American to earn a doctoral degree in psychology.

1926 Jean Piaget publishes *The Language and Thought of the Child.*

1933 Inez Beverly Prosser becomes the first African-American woman to earn a doctoral degree in psychology.

1938 B. F. Skinner promotes behaviorism, publishing *The Behavior of Organisms.*

1939 Kenneth Clark and Mamie Phipps Clark begin work that will be cited by the U.S. Supreme Court 1954 decision ending racial segregation in public schools.

1945 Karen Horney challenges the male bias in Freud's psychoanalytic theory and proposes a social-cultural approach.

1950 Erik Erikson publishes *Childhood and Society,* outlining stages of psychosocial development.

1954 Abraham Maslow presents the humanistic perspective. Gordon Allport publishes *The Nature of Prejudice*.

1961 Albert Bandura stresses the importance of imitation in learning, proposing a social-learning theory.

1969 John Berry calls attention to the importance of cross-cultural research in psychology.

1974 Eleanor Maccoby and Carol Jacklin publish *The Psychology of Sex Differences*.

1981 Roger Sperry receives a Nobel Prize for research on split-brain patients.

1993 Psychologist Judith Rodin becomes the first female president of an Ivy League school.

1998 Martin Seligman's APA presidential address launches the positive psychology movement.

2002 Daniel Kahneman receives a Nobel Prize for research on decision making.

Mary Whiton Calkins
(1863–1930)

ARCHIVES OF THE HISTORY OF AMERICAN PSYCHOLOGY—THE UNIVERSITY OF AKRON
Francis Cecil Sumner
(1895–1954)

OFFICE OF PUBLIC AFFAIRS AT COLUMBIA UNIVERSITY
Mamie Phipps Clark
(1917–1983)

ANDREAS RENTZ/GETTY IMAGES FOR BURDA MEDIA
Daniel Kahneman
(1934–)

© RAMIN TALAIE/CORBIS
Judith Rodin
(1944–)

(Ph.D.) in psychology. He also opened the first psychology laboratory in the United States (at Johns Hopkins University), and he was the first American Psychological Association (APA) president, elected in 1892.

Working with William James, Mary Whiton Calkins had to overcome discrimination and prejudice against women to become the first woman to complete the requirements for a Ph.D. in psychology, in 1895. Harvard at that time did not admit women and so would not award her a degree. Years later, Harvard offered to give her a degree from Radcliffe College (established by Harvard to educate women). Calkins refused the offer, stating that she had completed her work at Harvard, not Radcliffe. Calkins was elected president of the APA in 1905.

Margaret Floy Washburn was Edward B. Titchener's first graduate student at Cornell University, and she was the first woman to receive a Ph.D. in psychology. In 1908, Washburn wrote the first textbook on comparative psychology, which examined animal behavior.

Francis Cecil Sumner, in 1920, became the first African-American to receive a Ph.D. in psychology. Sumner wrote many articles on racial prejudice, education for African-Americans, and nature–nurture issues. Sumner also established the psychology department at Howard University.

Inez Beverly Prosser, the first African-American woman to earn a Ph.D. in psychology, completed the requirements in 1933 at the University of Cincinnati. She studied the development of African-American children in segregated and integrated schools.

Kenneth Clark and Mamie Phipps Clark were educational psychologists whose research was presented as evidence to the U.S. Supreme Court during the landmark court case on desegregating schools, *Brown v. Board of Education*. The Clarks helped show that internalized racism was a product of the stigmas attached to "separate but equal" schools for white children and black children. For instance, black children attending a segregated school (where they were apart from white children) often viewed "white" as good and pretty and "black" as bad and ugly. The Supreme Court listened to the Clarks' findings and mentioned them when ruling in 1954 that segregated schools were unconstitutional. Kenneth Clark was also the first African-American to be president of the APA.

Today, over two-thirds of all psychology doctorates are awarded to women, and nearly half of the presidents elected between 1996 and 2009 of the strongly science-focused Association for Psychological Science were women (Myers, 2010). Worldwide, psychology is growing rapidly. In 1977, China had no psychology departments in any of its universities. Less than thirty years later, there were over 200 (Tversky, 2008). But although roughly 33 percent of the U.S. population consists of minorities, the proportion of minority students in graduate programs is far from one in three. We can only hope that this gap will continue to close as university psychology departments across the country work to recruit the best and brightest students from all backgrounds. To meet the demands of our increasingly multicultural and ethnically diverse population, psychology will need to continue evolving.

KENNETH CLARK (1914–2005) AND MAMIE PHIPPS CLARK (1917–1983) Researchers whose work was used in the *Brown v. Board of Education* case that overturned segregation in schools.

PAUSE NOW OR MOVE ON

Turn to page 19 to review and apply what you've learned.

Six Psychological Perspectives

WHAT'S THE POINT?

1-5 How do six psychological theories explain thinking and behavior?

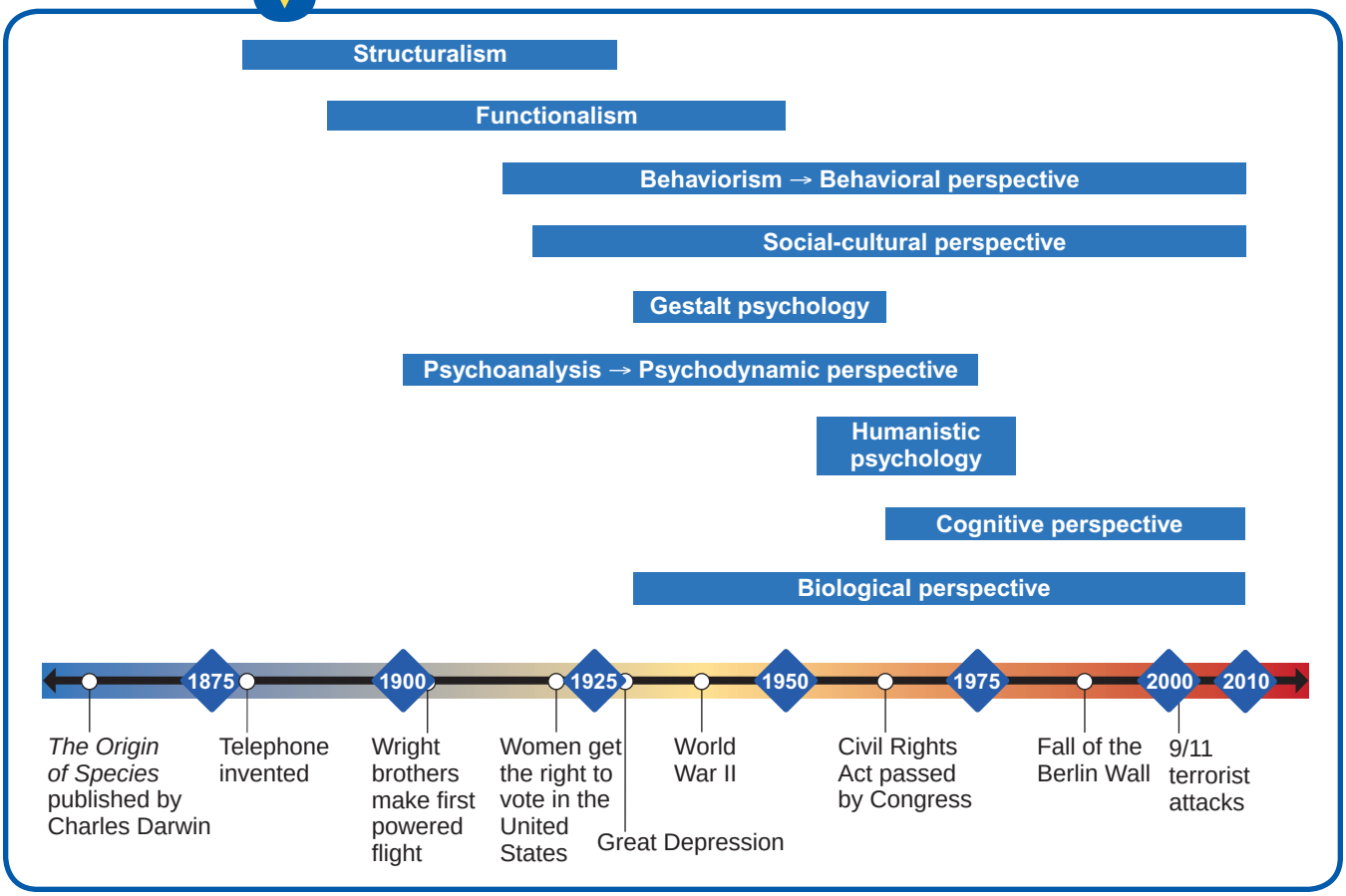
We can view behavior from many viewpoints, or perspectives. *Psychological perspectives, schools of thought,* and *psychological approaches* are all synonyms for the ways in which psychologists classify collections of ideas. Put another way, the psychologist who believes in a particular collection of ideas is said to view behavior from that particular perspective. For instance, a behaviorist views psychology from a behavioral perspective.

Psychology has seen many perspectives come and go. We have already noted the emergence of psychoanalysis, behaviorism, and humanistic psychology. The other three perspectives discussed here are the cognitive perspective, the biological perspective, and the social-cultural perspective (see **Figure 1.3**).

To understand these six perspectives, let's apply each to the same real-life possibility: whether or not a person helps a stranger pick up a spilled sack of groceries when given the opportunity. Why do some people help when others don't? Each of the six perspectives has an explanation.

Figure 1.3
Historical Development of Psychology's Main Schools of Thought

This figure shows the periods in which each psychological perspective has had its most profound influence on psychology's development. (Adapted from Schultz & Schultz, 2008.)



Psychologists who are psychoanalysts work from the *psychodynamic perspective,* a school of thought that focuses on how helping behavior springs from unconscious drives and conflicts. A psychologist influenced by the psychodynamic perspective might suggest that a person does *not* help the stranger pick up the groceries because she has an unresolved childhood conflict about her father always yelling at her to pick up her toys. The assumption is that there is a conflict, from long ago, that needs to be resolved. The psychologist assumes that until it is resolved, the conflict will affect behavior.

Psychologists who are behaviorists work from the *behavioral perspective,* a school of thought that focuses on how we learn observable responses. As we learned earlier, behaviorists believe we learn certain responses through rewards, punishments, and observation. So, they might suggest that a person helps the stranger pick up the spilled sack of groceries because that person had observed someone being rewarded for helpful behavior in the past. Learning that rewards come to those who help others fosters helping behavior.

Psychologists who are humanistic therapists work from the *humanistic perspective,* a school of thought that focuses on how healthy people strive to reach their full potential. A humanistic psychologist might suggest that a person who has met his own basic needs (hunger, thirst, shelter) would be able to reach out socially and help another person in need.

Structuralism, functionalism, and Gestalt psychology are the forerunners of the **cognitive perspective,** a school of thought that focuses on how people think—how they take in, process, store, and retrieve information. Remembering something you've learned, for example, is a cognitive activity. From the cognitive perspective, helping a stranger could be a function of how we think about or interpret a situation. We may choose to help the stranger who spills a bag of groceries because we *think* it will make us look good to others. However, if we think helping will cause us to look silly, then we may well leave the stranger to pick up the groceries alone.

The **biological perspective** is a school of thought that focuses on physical structures and substances underlying a particular behavior, thought, or emotion. Biological psychologists might remind us that levels of a naturally occurring "feel-good" chemical found in the brain could affect whether we help the stranger or not. Those lacking normal amounts of this brain chemical may be depressed, and depression could keep the person from wanting to help the stranger pick up the spilled groceries.

The **social-cultural perspective** is a school of thought that focuses on how thinking or behavior changes in different situations or as a result of cultural influences. Social-cultural psychologists might tell us that a person is more likely to help the stranger if that person is with some close-knit family members and 50 feet from his front door, and less likely if he is alone in a crowded, big-city grocery store he has never been to before.

As you can see, no one perspective lays claim to having all the answers to the question "What makes us tick?" But look at these six perspectives collectively (see **Table 1.1**). Can you see why most psychologists today subscribe to more than one perspective? These six perspectives complement one another, and psychologists draw from them all in their attempts to understand behavior and mental processes. Sometimes they even look beyond these six—to developments on psychology's horizon—in their efforts to understand human behavior.

cognitive perspective School of thought that focuses on how people think—how we take in, process, store, and retrieve information.

biological perspective School of thought that focuses on the physical structures and substances underlying a particular behavior, thought, or emotion.

social-cultural perspective School of thought that focuses on how thinking or behavior changes in different situations or as a result of cultural influences.

Table 1.1

Six Perspectives in Psychology

Perspective	Why Do We Help?
• **Cognitive**	
How we process information	Our individual interpretations of an event affect how we respond.
• **Biological**	
How our biological structures and substances underlie a given behavior, thought, or emotion	Our brain chemistry controls the emotions and thoughts that eventually produce helping behavior.
• **Social-Cultural**	
How thinking and behavior change depending on the situation or as a result of cultural influences	If we come from a cultural background that values helping, we're more likely to help. We're also more likely to help if we are in a comfortable situation, such as with a good friend, than if we are in a large, unfamiliar crowd.
• **Behavioral**	
How we learn through rewards, punishments, and observation	If we have witnessed or been rewarded for helping behavior in the past, we are more likely to help later.
• **Humanistic**	
How healthy people strive to reach their full potential	If our needs for nourishment and safety have been met, we are more likely to feel we can reach out and help others.
• **Psychodynamic**	
How we are affected by unconscious drives and conflicts	Unresolved inner conflicts can affect whether or not we help others.

PAUSE NOW OR MOVE ON

Turn to page 19 to review and apply what you've learned.

Psychology in the Twenty-First Century

WHAT'S THE POINT?

1-6 What are the basic ideas behind three of psychology's developing areas?

Psychology continues to grow. Three particularly strong developing areas in psychology are behavior genetics, evolutionary psychology, and positive psychology.

behavior genetics The school of thought that focuses on how much our genes and our environment influence our individual differences.

Those studying **behavior genetics** focus on how much our genes and environment influence our individual differences. Does this sound like a combination of biology and behaviorism? You bet. Apply the behavior genetics perspective to the helping example. A psychologist interested in

behavior genetics might ask two questions: Is there a helpfulness trait? If so, is it triggered into action by growing up in a family that promotes and values helping those in need? If the answer to both questions is *Yes,* and if you possess the helping trait and the helpful family, then you'll be bending down to help that stranger pick up the oranges and the loaf of bread. From the perspective of behavior genetics, helping behavior is the product of learning *and* inherited genetic traits.

Some psychologists study behaviors that helped our ancestors survive. These psychologists hope to gain insight into behavior by using the **evolutionary perspective.** This approach combines biological, psychological, and social aspects of human behavior. Is it possible to explain helping from the perspective of evolutionary psychology? Well, helping may have been a behavior generally seen as favorable, and helping could have occurred in the past because helping behavior made us more desirable to others. Those who were well liked in the community had good odds for surviving and successfully producing offspring.

Humanistic psychology is the forerunner of **positive psychology,** which became a force after Martin Seligman's 1998 APA presidential address on the positive psychology movement. Positive psychology shares with humanistic psychology a focus on wellness and on healthy people reaching their full potential, but it differs in one crucial way: Positive psychology is firmly grounded in psychological science, thereby avoiding humanistic psychology's lack of scientific research to support its theoretical foundations.

evolutionary psychology School of thought that focuses on the principles of natural selection to study the roots of behavior and mental processes.

positive psychology A movement in psychology that focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive.

PAUSE NOW OR MOVE ON

Turn to page 20 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 1

Thinking About History and Perspectives in Psychological Science

The Definition of Psychology

WHAT'S THE POINT?

1-1 What is psychology, and what kinds of topics do psychologists study?

- Psychology is the scientific study of behavior and mental processes.
- Psychologists rely on scientific research methods to answer questions.
- Any observable behavior or mental process can be studied by psychologists, with either a basic- or applied-research focus.

Apply What You Know

1. Which of the following best matches the definition of psychology?
   a. scientific research about why we act and think in the ways we do
   b. the study of people

c. thinking about human behaviors
d. investigations of the human psyche and why we think the things we think

2. What is the primary tool psychologists use to answer questions about behavior and thinking?
   a. insight
   b. dream analysis
   c. the unconscious mind
   d. the scientific method

Modern Psychology's Roots

WHAT'S THE POINT?

1-2 How did the study of psychology as a science get started?

- Wilhelm Wundt is considered the founder of modern psychology because he established a lab and used experimental methods to study consciousness.
- Edward B. Titchener introduced structuralism, the theory that the structure of conscious experience could be understood by analyzing the basic elements of thoughts and sensations.
- Gestalt psychology emphasized our tendency to integrate pieces of information into meaningful wholes.
- William James introduced functionalism, the theory that explored the ways consciousness helps people adapt to their environment.

Apply What You Know

3. Wilhelm Wundt is considered the founder of psychology as a science because
   a. it was decided that clinical psychology should become a medical field.
   b. of his important research on the unconscious mind.
   c. he established the first experimental psychology laboratory.
   d. he won the Nobel Prize for science.

4. Which research question would have been most interesting to the Gestalt psychologists?
   a. Why do we perceive objects in specific groups?
   b. Can introspection be used to describe thought accurately?
   c. What is the structure of conscious experience?
   d. How is our personality expressed in our dreams?

Psychology in the Twentieth Century

WHAT'S THE POINT?

1-3 In what ways did twentieth-century psychologists change how psychology was studied?

- Sigmund Freud introduced psychoanalysis, a theory of personality and therapeutic technique that attributes our thoughts and actions to unconscious motives and conflicts. Freud's new approach to understanding behavior and some of the ideas that developed from it have been incorporated into psychodynamic theory, which is a modernized version of Freud's original theories.
- Ivan Pavlov fostered interest in studying observable behavior by reporting how animals learn in certain situations.
- John B. Watson introduced behaviorism, the theory that psychology should only study observable behaviors, not mental processes. Behaviorism was the most dominant school of thought in psychology during the twentieth century and was later adapted and expanded by other behaviorists such as B. F. Skinner.
- Humanists such as Abraham Maslow and Carl Rogers emphasized conscious experience as the proper focus of psychology. They believed that humans have free will and that healthy people strive to reach their full potential.
- Jean Piaget's pioneering research in developmental psychology focused on how children develop their thinking abilities.

Apply What You Know

5. Sigmund Freud's theories differed from all other early psychological theories because of his emphasis on
   a. the effect of the unconscious mind on our thinking and behavior.
   b. our conscious experience and perception of the world around us.
   c. introspection as a form of gathering data about thinking.
   d. experimental research and gathering data on observable behaviors.

6. What was the primary complaint that Watson had about early psychological theories?
   a. Early theories emphasized human actions instead of the basic thinking behind them.
   b. Early theories addressed unconscious thinking instead of conscious experiences.
   c. Early theories were based on experimental methods instead of introspection.
   d. Early theories were too closely tied to William James's work.

Psychology's American Groundbreakers

WHAT'S THE POINT?

1-4 How did psychology's groundbreakers move psychology forward and help advance gender and race equality?

- G. Stanley Hall was the first American to receive a doctoral degree (Ph.D.) in psychology. He opened the first psychology laboratory in the United States and was the first American Psychological Association (APA) president.
- Mary Whiton Calkins was the first woman to qualify for a Ph.D. in psychology and was elected president of the APA in 1905.
- Margaret Floy Washburn was the first woman to receive a Ph.D. in psychology.
- Francis Cecil Sumner was the first African-American to receive a Ph.D. in psychology.
- Inez Beverly Prosser was the first African-American woman to earn a Ph.D. in psychology.
- Kenneth Clark and Mamie Phipps Clark were educational psychologists whose research was used during the *Brown v. Board of Education* Supreme Court case.

Apply What You Know

7. Kenneth and Mamie Phipps Clark's work, which showed that African-American children attending a segregated school often viewed "white" as _____, was used in the *Brown v. Board of Education* case that overturned _____.
8. Harvard University did not award Mary Whiton Calkins a doctoral degree, though she completed the requirements, because _____.

Six Psychological Perspectives

WHAT'S THE POINT?

1-5 How do six psychological theories explain thinking and behavior?

- Psychological perspectives describe the ways in which psychologists view thinking and behavior. Many historical theories were forerunners to one or more modern perspectives.
- Psychological perspectives include the psychodynamic, behavioral, humanistic, cognitive, biological, and social-cultural perspectives.
- Psychodynamic psychologists focus on how our behavior springs from unconscious drives and conflicts.
- Behavioral psychologists believe we learn responses through rewards, punishments, and observation.
- Humanistic psychologists focus on how healthy people strive to reach their full potential.
- The cognitive perspective focuses on how people think—how they take in, process, store, and retrieve information.
- The biological perspective focuses on physical structures and substances underlying a particular behavior, thought, or emotion.
- The social-cultural perspective focuses on how thinking or behavior changes in different situations or as a result of cultural influences.

Apply What You Know

9. A psychologist from which psychological perspective would be most likely to agree that thinking and behavior are caused by combinations of hormone and neurotransmitter activity in the brain?
   a. cognitive
   b. social-cultural
   c. biological
   d. behavioral
10. A psychologist from which psychological perspective would be most likely to agree that people act in the ways they do because of rewards and punishments?
   a. social-cultural
   b. biological
   c. cognitive
   d. behavioral

Psychology in the Twenty-First Century

WHAT'S THE POINT?

1-6 What are the basic ideas behind three of psychology's developing areas?

- Behavior genetics focuses on how much our genes and environment influence our individual differences (a combination of biology and behaviorism).
- Evolutionary psychology focuses on behaviors that helped our ancestors survive and combines biological, psychological, and social theories of human behavior.
- Positive psychology focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive.

Apply What You Know

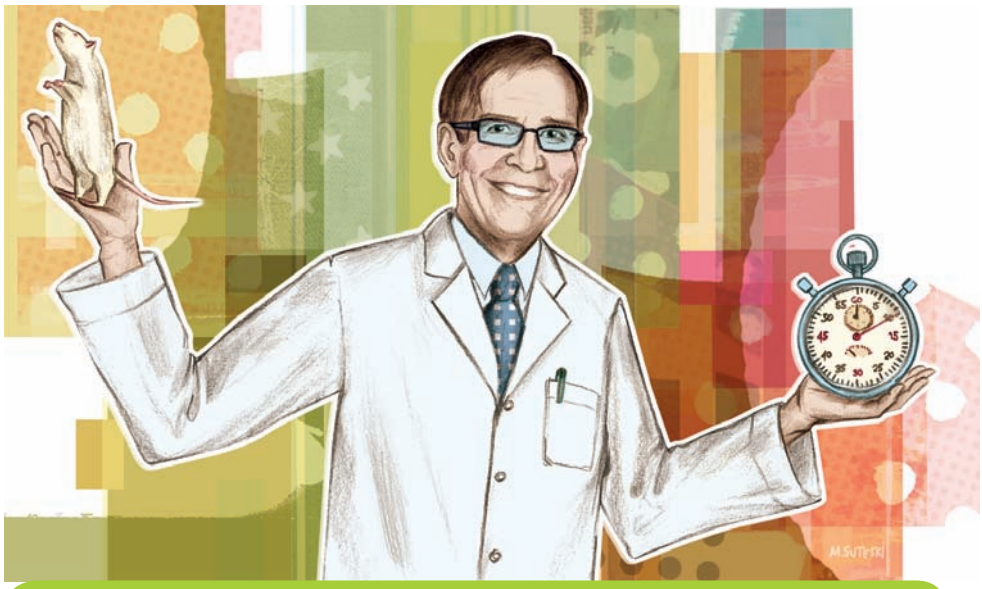
11. Which psychological perspective is most directly interested in factors such as wellness and human thriving?
    a. the psychodynamic perspective
    b. behavior genetics
    c. positive psychology
    d. evolutionary psychology
12. Which psychological perspective is most directly interested in how genes and experiences combine to form personalities?
    a. behavior genetics
    b. the humanistic perspective
    c. the psychodynamic perspective
    d. positive psychology

KEY TERMS AND KEY PEOPLE

psychology, p. 5
basic research, p. 5
applied research, p. 5
structuralism, p. 7
Gestalt [gih-SHTALT] psychology, p. 7
functionalism, p. 8
psychoanalysis, p. 9
behaviorism, p. 10
humanistic psychology, p. 10
cognitive perspective, p. 15
biological perspective, p. 15
social-cultural perspective, p. 15
behavior genetics, p. 16
evolutionary psychology, p. 17
positive psychology, p. 17
Wilhelm Wundt [VOONT] (1832–1920), p. 6
Edward B. Titchener (1867–1927), p. 7
William James (1842–1910), p. 8
Sigmund Freud (1856–1939), p. 9
Ivan Pavlov (1849–1936), p. 9
John B. Watson (1878–1958), p. 10
B. F. Skinner (1904–1990), p. 10
Abraham Maslow (1908–1970), p. 10
Carl Rogers (1902–1987), p. 10
Jean Piaget [pee-ah-ZHAY] (1896–1980), p. 11
Kenneth Clark (1914–2005) and Mamie Phipps Clark (1917–1983), p. 13

MODULE 2

Research Strategies



Psychological scientists use a variety of tools to learn about behavioral and mental processes.

How do you know what you know? You can know something because a friend told you or because you read it. You can also know something because it "seems obvious"—in other words, through common sense. These and many other ways of knowing may be right. But they may also be wrong. Psychologists use the **scientific method,** a method of learning about the world through the application of critical thinking and tools such as observation, experimentation, and statistical analysis. Psychologists rely on the scientific method because it is more likely to answer certain kinds of questions correctly. In this module, we explore some research tools available to scientists seeking knowledge. It is because psychologists use these tools that psychology is considered a science.

Why Is Research Important?

Observation and Bias

Case Studies

Correlation

Surveys

Longitudinal and Cross-Sectional Studies

Experiments

- Hypotheses and Operational Definitions
- Independent and Dependent Variables
- Groups, Random Assignment, and Confounding Variables
- Control for Other Confounding Variables
- Data Analysis Replication

Research Ethics

- Human Research
- Animal Research

scientific method A method of learning about the world through the application of critical thinking and tools such as observation, experimentation, and statistical analysis.

The Scientific Method at Work

What do these individuals have in common? They are researchers who rely on the scientific method to learn about their chosen area of study. By using the tools of science and critical thinking, they can help us understand how the world operates.

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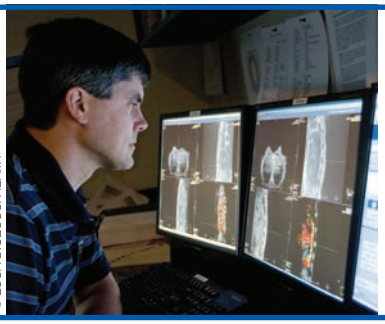
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SCIENCE SOURCE

Why Is Research Important?

WHAT'S THE POINT?

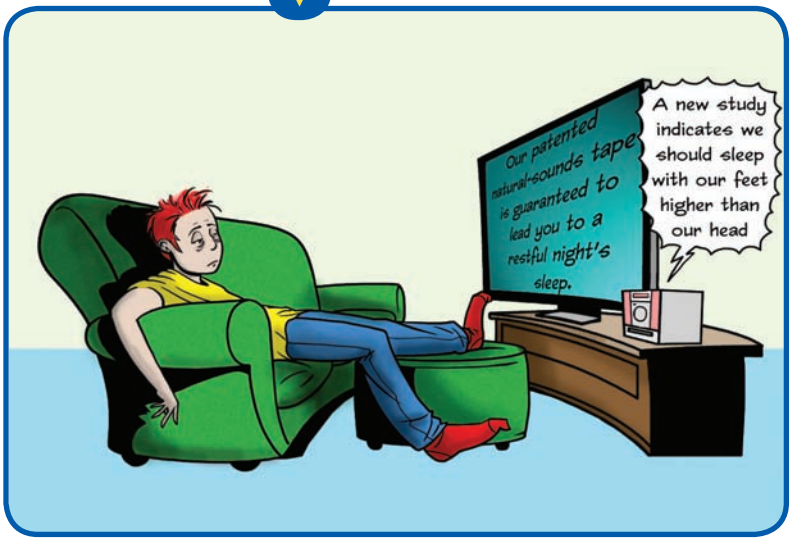
2-1 What advantage does research have over other ways of knowing things?

Many students sign up for their first psychology class hoping to cover the "good stuff" associated with the psychology they've seen on TV and in popular magazines. How do I analyze my dreams? Does my friend have an eating disorder? What makes the opposite sex tick? Too often, the "answers" we find in the media are more myth than reality. Psychology can answer these questions, but without research there would be no way to know which answers are correct.

Even if you don't believe you're interested in research, give it a chance. Do you like solving problems and figuring out the answers to puzzles? If so, research should be right up your alley because research is not just a series of experiments. It's a set of methods, a way of asking questions about the world and drawing logical, supported conclusions. These are important life skills for everyone. Headlines trumpet the latest findings about caffeine, and news anchors are forever introducing segments on new ways to treat depression and on how the brain works. If you don't know enough about research to decide when conclusions are reasonable and when they are not, you leave yourself at the mercy of the media (see **Figure 2.1**). We surely won't all conduct research, but we will all be called on to evaluate its relevance. Just as modern civilization requires people to be computer literate to function well, it requires people to be research literate to make informed decisions.

Figure 2.1
How Do You Know What to Believe?

Critical thinking and knowledge of research help us evaluate competing claims.


Our patented natural-sounds tape is guaranteed to lead you to a restful night's sleep.
A new study indicates we should sleep with our feet higher than our head

In this module, we will see how psychologists conduct research by considering an example. Suppose your school is about to institute a new policy banning the use of iPods and other music players in study halls. How might we predict the effect of this new policy?

One way is to use common sense. Perhaps the common sense of school

Table 2.1

The Limits of Common Sense

Common sense leaves us unsure of the truth, but research helps us apply principles appropriately in different situations.

Common sense says . . .		
Opposites attract	but	Birds of a feather flock together
Out of sight, out of mind	but	Absence makes the heart grow fonder
Nothing ventured, nothing gained	but	A penny saved is a penny earned

confirmation bias The tendency to focus on information that supports preconceptions.

administrators told them that students can concentrate better if they are not distracted by music. But wait! *Your* common sense might lead you to the opposite conclusion. Maybe you feel that the music allows you to block out distracting noises and focus more effectively on your homework. That's the trouble with common sense; too often, it can lead you to whatever conclusion you want (see **Table 2.1**). Scientific methods that psychologists use can help you evaluate the competing hunches.

PAUSE NOW OR MOVE ON

Turn to page 38 to review and apply what you've learned.

Observation and Bias

WHAT'S THE POINT?

2-2 What are some ways that bias can influence research?

Listen Up!

Does listening to your iPod affect studying? Science can provide answers to questions like this.

CHARLES BLAIR-BROEKER

The simplest scientific technique is *observation*. In our example, you might watch students using music players and compare them with students not using music players. Which students look more focused and more intent on their work?

Observation, however, does present a problem: the potential for bias. The most common bias on the part of the researcher is called **confirmation bias,** a tendency to search for information that confirms a preconception. As you might imagine, researchers try to avoid bias as they would the plague. In our example, you and an administrator might observe the same students listening to music while studying and come to opposite conclusions. You want the research to

CHARLES BLAIR-BROEKER

Confirmation Bias

Both the administrator and a student tend to notice examples that support their points of view.

demonstrate that music is helpful, so you may be especially sensitive to behaviors that support this conclusion. An administrator may be more likely to miss the behaviors you notice and may instead pay closer attention to actions that seem to indicate music is distracting. Both you and the administrator are being influenced by your biases.

There are many ways to reduce confirmation bias, and the best method depends on the particular study. In our example, we might try to make the observations more *objective* (that is, less biased) by finding ways to rely less on the observer's opinion. For example, we could compare the grades of students who listen to music while studying with the grades of students who don't. Or perhaps we could have the observers count specific behaviors, like how many times in a 10-minute period students look away from their work or how many pages students read in 10 minutes. If you're thinking these methods could have flaws as well (just because students are turning pages does not mean they are learning anything), congratulations! You're using **critical thinking.** Psychologists use critical thinking to examine assumptions, discern hidden values, evaluate evidence, and assess conclusions.

The point is that there is no perfect way to eliminate bias. The goal of psychological research is to minimize bias and maximize the probability of obtaining a reliable, meaningful conclusion.

Researchers must also watch for **participant bias,** a tendency for research participants to behave in a certain way because they know they are being observed or they believe they know what the researcher wants. For example, the students might study harder because the administrator is in the room, which might lead the administrator to conclude that they are studying more effectively because they are not distracted by music. To minimize participant bias, psychologists often use **naturalistic observation,** observing and recording behaviors without manipulating or controlling the situation. To avoid influencing participants' behavior simply because of their presence, observers in a lab setting may use hidden cameras or one-way mirrors.

Naturalistic Observation

Under which circumstances do you think the principal's observations are more accurate? Naturalistic observation requires that the behavior not be unduly influenced by the observer. Can you see that this might sometimes produce ethical concerns?

PAUSE NOW OR MOVE ON

Turn to page 38 to review and apply what you've learned.

CHARLES BLAIR-BROEKER

CHARLES BLAIR-BROEKER

Case Studies

WHAT'S THE POINT?

2-3 Why do psychologists use case studies?

In the previous section, we looked at observation and bias. Now we turn our attention to a specific technique that relies on observational skills. Researchers who study single individuals in depth in the hope of revealing universal principles are using the **case study** method. It is important to keep in mind that the case study method is prone to bias, and it may not be possible to extend the results of one case study to other people or situations. For example, an in-depth study of just one iPod-using student in study hall could provide some very unrepresentative results because that student could naturally be exceptionally focused or distractible.

Sometimes, however, a case study is all that is ethically possible. Child abuse, for example, is usually researched with case studies. Obviously, it would be unethical for researchers to abuse a sample of children, so they must wait until authorities discover a case of abuse and then attempt to study the effects of that abuse. "Genie" was the subject of just such a study. She was discovered in California in 1970, a 13-year-old victim who had spent her life in such isolation that she had not even learned to speak. Since 1970, psychologists have intensively studied Genie's behavior and progress to learn about the development of language and social skills. Researchers who study cases such as Genie's hope that they can glean important knowledge from these tragic situations that can help explain general truths about human development and behavior.

Because no two cases of abuse are exactly alike, there is always some doubt about the conclusions of any one case study. But as similar case studies accumulate, researchers gain increasing confidence in the accuracy of their conclusions.

PAUSE NOW OR MOVE ON

Turn to page 39 to review and apply what you've learned.

critical thinking Thinking that does not blindly accept arguments and conclusions.

participant bias A tendency for research participants to behave in a certain way because they know they are being observed or they believe they know what the researcher wants.

naturalistic observation Observing and recording behavior in naturally occurring situations without manipulating or controlling the situation.

case study A research technique in which one person is studied in depth in the hope of revealing universal principles.

correlational study A research project strategy that investigates the degree to which two variables are related to each other.

Correlation

WHAT'S THE POINT?

2-4 Why is it impossible to conclude cause-and-effect relationships from correlational data?

Another technique available to researchers is to collect and examine correlational data. Is there a relationship between diet and health? Between communication style and divorce? Between training techniques and success at the Olympics? To answer these kinds of questions, researchers use a **correlational study,** a

research project designed to discover the degree to which two variables are related to each other. In the question we are examining, there are two variables:

1. Whether or not a student listens to music
2. Studying effectiveness

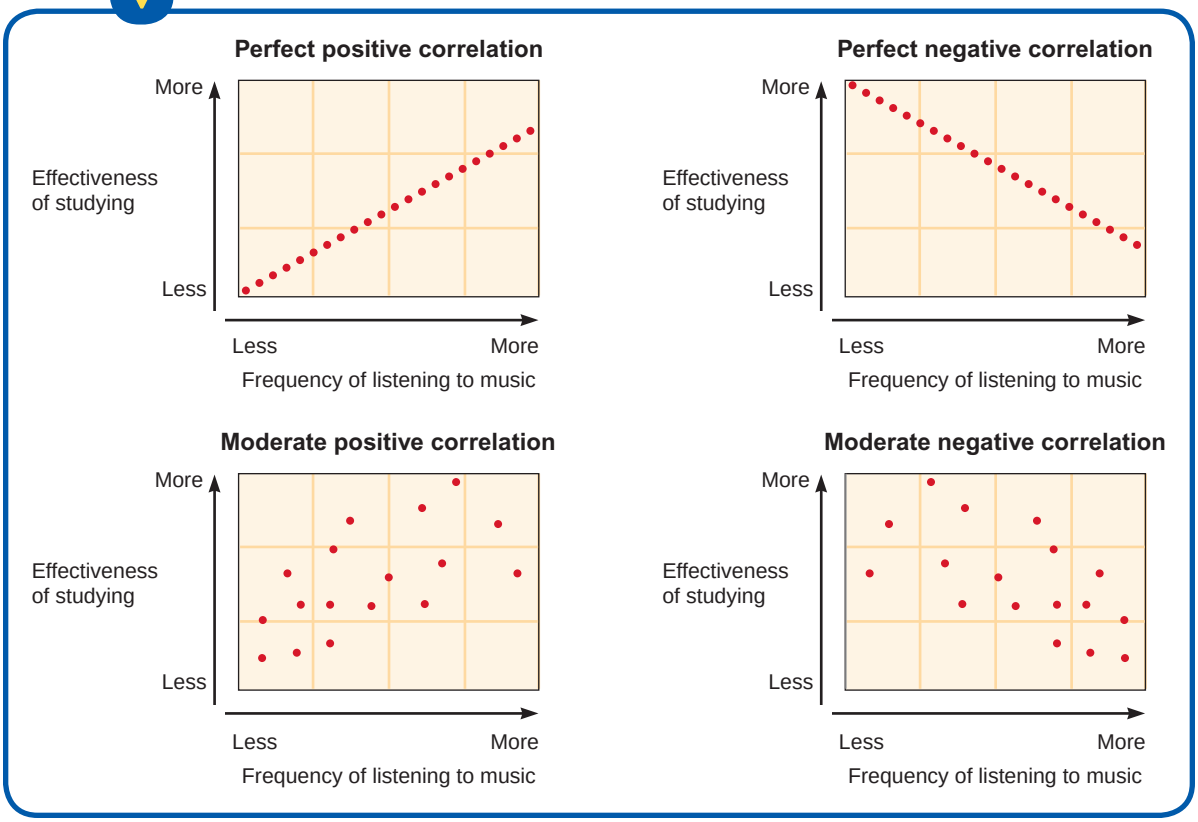
If studying effectiveness increases when students listen to music and decreases when students do not, then we can say that the two variables are *positively correlated*. That is, both variables increase (or decrease) together. But if studying effectiveness decreases when students listen and increases when they do not, then the variables are *negatively correlated*—one variable increases while the other decreases (see **Figure 2.2**).

It is very important to remember that the discovery of a correlation *does not prove that a cause-and-effect relationship exists*. Results from correlational studies can tell us that two variables are related but not *why* they are related. Suppose a researcher discovered a negative correlation between TV watching and grade point average (GPA): Students who watched more television had lower GPAs. Based on this correlation alone, can we conclude that TV watching *causes* grades to suffer? The answer is *No*. It is indeed *possible* that watching television causes one's grades to decline, but there are other possible explanations as well. It may be that having low grades causes one to watch more TV. There could even be some other variable—say, low intelligence—that could cause both a lot of TV watching and low grades. Correlation does not tell us which of these explanations is correct (see **Figure 2.3**).

Correlations cannot establish cause-and-effect relationships, but they are useful for making predictions. If you know there is a strong negative

Figure 2.2
Positive and Negative Correlations

The two top graphs show what perfect positive and negative correlations would look like for listening to music and studying effectiveness. In the positive correlation, as music use increases, so does effectiveness of studying. In the negative correlation, effectiveness of studying decreases as music use increases. Actual data would surely look more like one of the two bottom graphs, which show moderate positive and negative correlations.



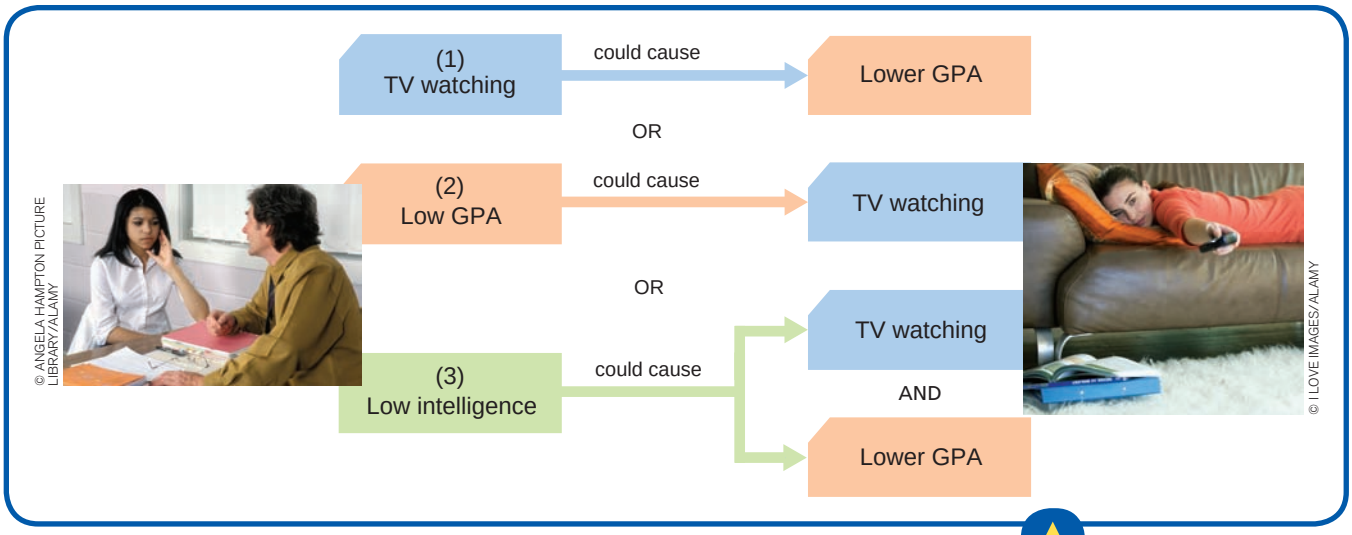


Figure 2.3
Correlation Is Not Causation

The discovery of a negative correlation between TV watching and grade point average (GPA) would not provide any information about what caused the correlation. Here are three equally plausible explanations.

correlation between TV watching and grades, and if you know a student watches several hours of television each day, then you can predict that the student will have a relatively low GPA. This is true even if more TV watching does not directly cause the low grades. The stronger the correlation, the more accurate your prediction will be.

PAUSE NOW OR MOVE ON

Turn to page 39 to review and apply what you've learned.

Surveys

WHAT'S THE POINT?

2-5 Why should we be cautious when applying data obtained from surveys?

How do researchers go about collecting data to establish a correlation? One way is to use the **survey method,** a research technique that questions a sample of people to collect information about their attitudes or behaviors. In the music example, you might have students fill out a short questionnaire about the effect of iPod use in study hall. Surveys allow researchers to collect large amounts of data efficiently through the use of such questionnaires and interviews.

There is no doubt about the efficiency of surveys or about the value of being able to collect data from large numbers of people relatively inexpensively. The problem is that surveys are almost seductively efficient. It seems so simple to create a survey that people often don't consider how easily bias can influence the wording of the questions. "Do you like flowers?" for example, will not get the same response as the question "Do you like horticulture?" Surveys also raise the problem of *social desirability.* For example, a student

survey method A research technique that questions a sample of people to collect information about their attitudes or behaviors.

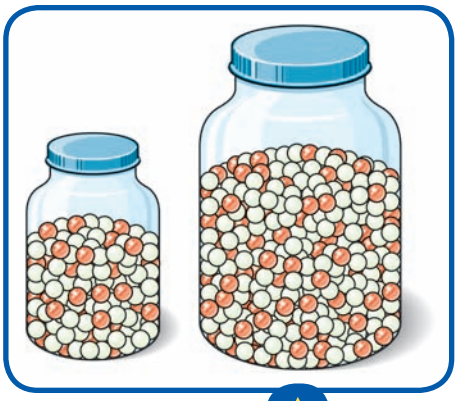


Figure 2.4
Sample and Population

The larger jar contains a population—in this case, a mixture of two colors of marbles. You can efficiently learn the percentage of each color in this larger group of marbles by randomly removing a sample (represented by the marbles in the smaller jar) and counting the two colors.

may say that she can study effectively while listening to music even though she doesn't really believe it. She answers that way because she thinks that her classmates would want that to be the answer.

But assume you have carefully designed your survey questions to avoid bias. You still must be sure your survey results will be relevant to the **population,** the entire group of people about which you would like to know something. To do this, you must draw an adequately sized **random sample,** a sample that fairly represents a population because each member of the population has an equal chance of being included (see **Figure 2.4**).

If the population you wish to study is the students in study halls at your school, you could, for example, draw a random sample by selecting every tenth name from a list of students registered for study halls. But is this number adequate? Researchers answer that question with mathematical formulas, but, in general, larger samples are better—if they are random. If the sample is not random, it is said to be biased and will not be a good sample no matter how large it is.

PAUSE NOW OR MOVE ON

Turn to page 39 to review and apply what you've learned.

Longitudinal and Cross-Sectional Studies

WHAT'S THE POINT?

2-6 Why do psychologists conduct longitudinal and cross-sectional studies?

Are you ready to examine still more research tools? Longitudinal and cross-sectional studies are techniques of particular use to developmental psychologists, who study how individuals change throughout the life span. **Longitudinal studies** follow the same group of individuals over a long period of time. In the 1920s, psychologist Lewis Terman began a famous longitudinal study of a group of highly intelligent California children. He, and later other researchers, studied these individuals for 70 years to discover what happens to bright children as they grow up. The researchers learned that, in general, these gifted people had successful careers (Holahan & Sears, 1995). Longitudinal studies provide a rich source of data as time passes, but they are quite expensive and difficult to conduct. As a result, they tend to be pretty rare. Imagine the challenges of keeping track of a group of study hall students throughout their lifetimes to determine the long-term effects of listening to (or not listening to) music with headphones.

It is more common to conduct **cross-sectional studies,** which compare people of different ages at one time. A psychologist interested in how creativity changes over the life span could gather a random sample of people from

population The entire group of people about whom you would like to know something.

random sample A sample that fairly represents a population because each member of the population has an equal chance of being included.

longitudinal study A research technique that follows the same group of individuals over a long period.

cross-sectional study A research technique that compares individuals from different age groups at one time.

different age groups and administer a test of creativity to all of them. Cross-sectional studies are more efficient than longitudinal studies, but they have their own problems. If the test showed that the older groups were less creative than the younger groups, that *could* mean that creativity declines as people age. But this difference could also be explained by other factors, such as changes over time in the educational system or the introduction of computers (or headphones).

PAUSE NOW OR MOVE ON

Turn to page 39 to review and apply what you've learned.

Experiments

WHAT'S THE POINT?

2-7 Why are experiments the most powerful research technique of all, and what factors contribute to the design of an experiment?

Observation, case studies, correlational studies, surveys, longitudinal studies, and cross-sectional studies are all important research techniques. Psychologists often use these different techniques in combination—for example, by using naturalistic observations to do a case study or by conducting surveys to establish correlations. But for establishing *cause and effect,* there is only one game in town, and researchers prefer it above all others. The **experiment** is the *only* method that allows us to draw conclusions about cause-and-effect relationships. Because experiments require researchers to control the variables in a study, the chances of isolating the variable causing a particular effect are much greater.

Let's design an experiment to find out if banning listening to music in study halls would affect grades.

Hypotheses and Operational Definitions

In designing our experiment, the first thing we would do is generate a **hypothesis**—a testable prediction about the outcome of research. Researchers often start with general expectations ("Music influences concentration in study halls") but then put their variables in a more specific form that allows them to be precisely measured. In the language of research, they provide **operational definitions** of the variables—explanations of the exact procedures used to define research variables. One way to operationalize our hypothesis is to put it in this form: "Students assigned to listen to music each day in study hall will have higher average grades at the end of the quarter than students banned from listening to music." Notice that we could have

experiment A research method in which the researcher manipulates and controls certain variables to observe the effect on other variables.

hypothesis A testable prediction about the outcome of research.

operational definition An explanation of the exact procedures used to make a variable specific and measurable for research purposes.

operationalized the hypothesis in many other ways. We could have said, "Students who are banned from listening to music each day in study hall will read fewer pages each day than students who are not banned from listening to music," or "Students who use iPods each day in study hall will have fewer conversations with other students than students who are not allowed to use iPods." Each of these versions has slightly different implications. Researchers must settle on the one operational definition that they believe does the best job of accurately reflecting the general hypothesis.

This is an important point to understand, even if you never conduct an experiment of your own. When you are evaluating research done by others, you should consider whether the operational definitions are appropriate or inappropriate. For example, every year *Money* magazine publishes an article about the "best places" to live in the United States. How do these researchers operationalize "best"? You have to read the article to learn that they use a complex formula to score each place on a variety of variables, including climate, unemployment rate, cultural opportunities, crime, and so on. If you don't agree with these criteria that operationalize "best," then you won't find the conclusions acceptable, either. If you like snowstorms, already have a steady job, and don't care much for theater and the ballet, you may end up seriously disappointed in a highly rated community. (To see how operational definitions are important in positive psychology, see Thinking About Positive Psychology: Operational Definitions and Positive Psychology.)

Independent and Dependent Variables

Back to our experiment. Let's assume we have agreed on this hypothesis: "Students assigned to listen to music each day in study hall will have higher average grades at the end of the quarter than students banned from listening." To discuss this hypothesis, you should know a little more about how variables are labeled. Trying to discuss experiments without knowing the different names for variables is like trying to discuss skateboarding without knowing the names of the tricks. It may be possible to describe a "kickflip backside tailslide" without knowing the phrase, but it sure is difficult.

You already know that the purpose of an experiment is to establish a cause-and-effect relationship. Every hypothesis for an experiment reflects this cause-and-effect pattern, and when you read a hypothesis, you should be able to identify two variables, the independent variable and the dependent variable:

- The variable that should cause something to happen is the **independent variable (IV).**
- The variable that should show the effect (or the outcome) of changing the IV is the **dependent variable (DV).**

independent variable (IV) The variable that the researcher will actively manipulate and, if the hypothesis is correct, that will cause a change in the dependent variable.

dependent variable (DV) The variable that should show the effect of the independent variable.

Whenever you think about an experiment, a good first step is to identify the IV and the DV. If you are unable to figure this out, you will almost certainly not understand the point of the experiment.

So, what is the IV—the "cause variable"—for our example? In our hypothesis, the variable that we predict will make a difference—our IV—is the presence or absence of music. The DV, or the variable that shows the effect, is the participants' average end-of-quarter grades.

Thinking About POSITIVE PSYCHOLOGY

Operational Definitions and Positive Psychology

Positive psychologists have research problems similar to those faced by all scientists. One of them is to develop adequate operational definitions. Like many things, this is often more difficult than it appears.

For example, positive psychologists are interested in happiness. They recognize that it's not exactly the opposite of, or even the absence of, depression. So, what is it? And more importantly, how do you measure it for research purposes? There are many ideas about how to do this, and none of them are perfect.

- Perhaps you could measure happiness with some physiological measure. Wouldn't it be nice if it were as easy to measure happiness as it is to measure blood pressure or cholesterol level? Yes, it would be nice, but so far we haven't been able to discover a direct physiological measure.
- Maybe you could measure happiness using observation. One way to do this would be to look for evidence that a person is smiling. However, people don't always agree about what a smile is—another operational definition problem! Smiles aren't always genuine, either, and it's also possible to be happy without smiling.
- Another way to measure happiness would be to administer surveys, and survey results, in fact, are often used as the operational definition of happiness. One such survey is the **Satisfaction With Life Scale** (Diener et al., 1985). Why don't you give it a try!

Satisfaction With Life Scale

Directions: Below are five statements with which you may agree or disagree. Using the 1–7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = strongly disagree
2 = disagree
3 = slightly disagree
4 = neither agree nor disagree
5 = slightly agree
6 = agree
7 = strongly agree

__ 1. In most ways my life is close to my ideal.
__ 2. The conditions of my life are excellent.
__ 3. I am satisfied with my life.
__ 4. So far I have gotten the important things I want in life.
__ 5. If I could live my life over, I would change almost nothing.

Source: Diener et al. (1985).

Scores on this **Satisfaction With Life Scale** can range from 5 to 35, with scores above 20 generally indicating satisfaction with life. Does your overall score seem accurate? Does it match your impression of what it means to be happy? If so, that means you believe that scores on this survey are a good operational definition of happiness.

Groups, Random Assignment, and Confounding Variables

To make the independent variable vary (take on different values), researchers set up groups of participants. Typical experiments have at least two groups: an experimental group and a control group (sometimes referred to as the experimental and control conditions). In the **experimental group,** the participants are exposed to the treatment (the IV). In the **control group,** the participants are not exposed to the treatment (the IV). Control group participants function as a comparison for the experimental group participants. In our example, the experimental group will comprise all students assigned to listen to music and the control group will comprise all students who are not

experimental group The participants in an experiment who are exposed to the independent variable.

control group The participants in an experiment who are not exposed to the independent variable.

random assignment A procedure for creating groups that allows the researcher to control for individual differences among research participants.

confounding variable In an experiment, a variable other than the independent variable that could produce a change in the dependent variable.

allowed to listen. These two groups will permit us to compare the effect of music on two groups of similar students.

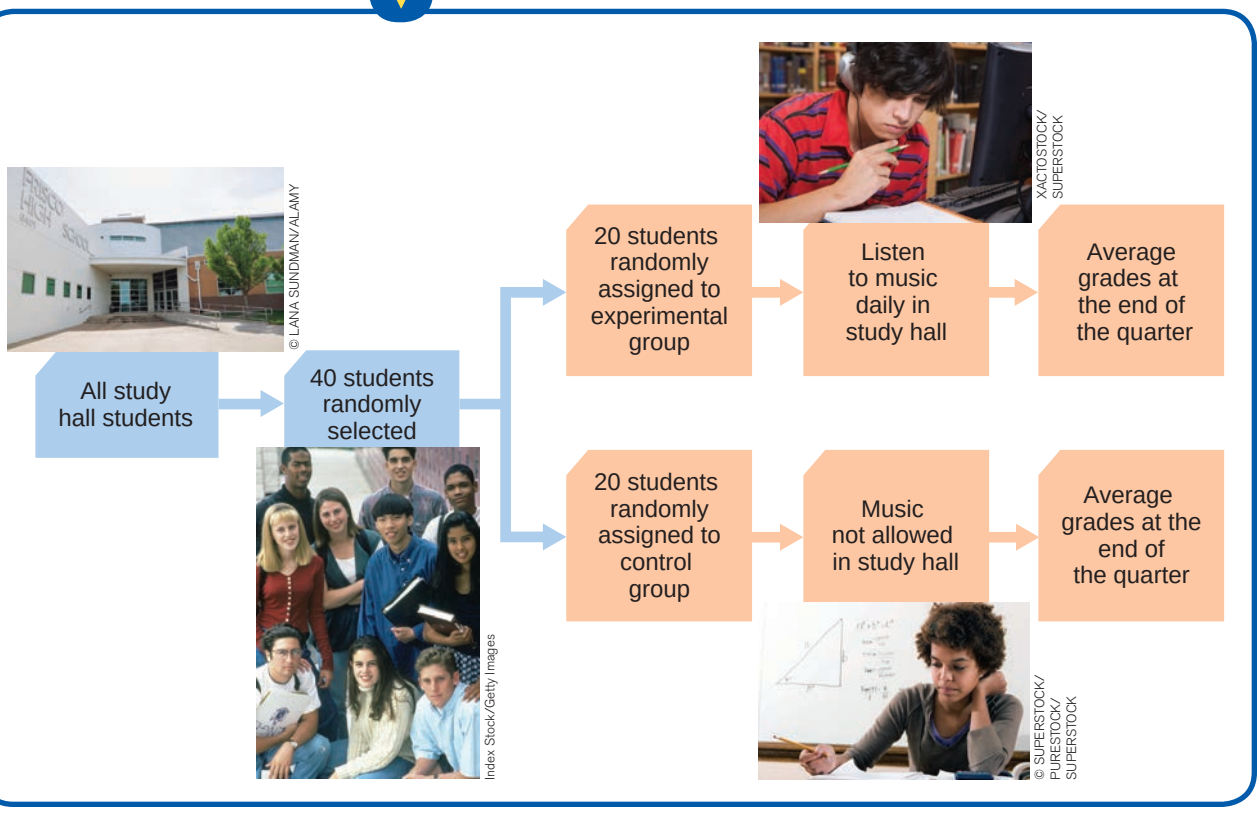
The number of participants assigned to each group depends on some complicated statistical factors, but usually there are at least 20 participants per group. Therefore, we need to select 40 students for the experiment. We need to draw these students randomly from the entire population of 400 study hall students (for example, by selecting every tenth name from a complete list of study hall students). If the selection is not random, the sample may be biased, and we would not be able to apply the results to the whole study hall population.

Now comes one of the most important steps: How do we decide which 20 students in the pool of participants should be in the experimental group and which 20 should be in the control group? An absolutely critical feature of experimental design is that the participants are placed in groups by **random assignment.** Because chance alone determines group assignment, we can assume individual differences among participants will be equally distributed between the two groups. You could use a computer program to do the random assignment or a low-tech method like drawing names out of a hat. **Figure 2.5** summarizes the various components of our design.

These individual differences among participants are the largest category of a special kind of variable known as **confounding variables** (from a Latin word that means "to confuse"), or variables other than the IV that could produce a change in the DV. To draw cause-and-effect conclusions from an experiment, researchers must adequately control for confounding variables. To see how this works, imagine for a moment that the students in our experimental group (those assigned to listen

Figure 2.5
Experimental Design

The hypothesis is that students who are assigned to listen to music in study hall will have higher average grades at the end of the quarter than students banned from listening to music. To create different levels of the IV, the presence or absence of music, 40 randomly sampled students will be randomly assigned to an experimental group that listens to music and a control group that does not. Later we will determine the effect of this manipulation by measuring the DV, average grades at the end of the quarter, for each group. The hypothesis leads us to predict that the experimental group will have higher average grades.


© LANA SUNDMAN/ALAMY
All study hall students
40 students randomly selected
Index Stock/Getty Images
20 students randomly assigned to experimental group
Listen to music daily in study hall
Average grades at the end of the quarter
XACTOSTOCK/ SUPERSTOCK
20 students randomly assigned to control group
Music not allowed in study hall
Average grades at the end of the quarter
© SUPERSTOCK/ PURESTOCK/ SUPERSTOCK

to music) are also healthier than the students in the control group (those banned from music). If the experimental group does have higher average grades at the end of the quarter, how would we know what caused this? The cause could have been the IV—music—but it could also have been the higher level of health in the experimental group. We really don't know because the health variable *confounds* the music variable.

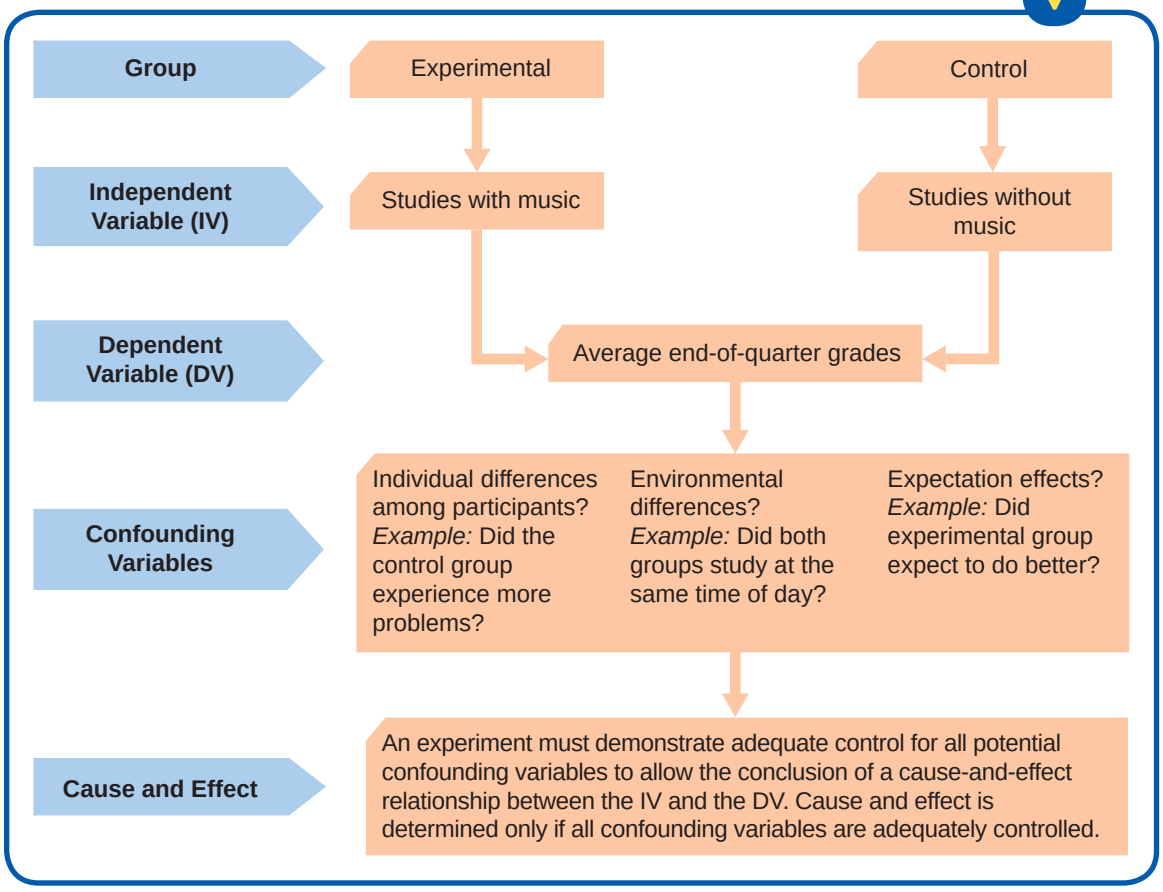
We have to be careful about how we set up the two groups so that we can eliminate confounding variables that could influence our experimental group's performance. Potential confounding variables include the amount of sleep participants get, the number of personal problems they're experiencing, and the quality of the teachers they have. This is why random assignment of participants to groups is so critical: It enables the researcher to assume that these potentially confounding factors will balance almost evenly across the two groups, just as 40 coin flips will usually balance fairly evenly between heads and tails. (Go ahead. Try it!) Without random assignment, there is a much greater likelihood that a confounding variable will bias the results of the research. You have to randomly assign participants to groups to conduct a true experiment and identify the cause-and-effect relationship between the IV and the DV.

Control for Other Confounding Variables

In addition to controlling for individual differences, a good experimental design must control for two other types of confounding variables: environmental differences and expectation effects (see **Figure 2.6**). It is relatively easy to control

Figure 2.6
The Challenge of Confounding Variables

Experimenters use a variety of techniques to minimize the disruptive effects of confounding variables. There are two challenges involved: anticipating what the confounding variables will be, and then deciding on the best method of dealing with each of them.


Group
Experimental
Control
Independent Variable (IV)
Studies with music
Studies without music
Dependent Variable (DV)
Average end-of-quarter grades
Confounding Variables
Individual differences among participants? *Example:* Did the control group experience more problems?
Environmental differences? *Example:* Did both groups study at the same time of day?
Expectation effects? *Example:* Did experimental group expect to do better?
Cause and Effect
An experiment must demonstrate adequate control for all potential confounding variables to allow the conclusion of a cause-and-effect relationship between the IV and the DV. Cause and effect is determined only if all confounding variables are adequately controlled.

double-blind procedure A research procedure in which both the data collectors and the research participants do not know the expected outcome of the experiment.

placebo An inactive substance or condition used to control for confounding variables.

for environmental differences. In our music example, you would want to make sure that all participants were in a study hall with the same temperature, lighting, and noise conditions.

Researchers must take special care, however, to control for expectation effects. They begin by making sure that participants are not aware of the hypothesis of the experiment. If participants were aware, then their expectations could influence the outcome. In our example, students in the experimental group might do better because their knowledge of the hypothesis raised their confidence. To control for expectation effects, experimenters often use a *blind* (or masked) procedure, which means that they do not tell participants what the hypothesis is until after the data are collected. Sometimes researchers use a **double-blind procedure,** in which both the data collectors and the research participants do not know the expected outcome of the experiment. Using a double-blind procedure is particularly important when the researchers collecting data are asked to make judgments about the dependent variable (for example, judging whether or not students are studying effectively). Without the double-blind procedure, researchers might be inclined to see what they expected to see and not see what they didn't expect.

In experiments where a drug is the independent variable, researchers deal with expectation effects by using a **placebo,** an inactive pill that has no known effect. Imagine that you want to test the effectiveness of a new drug that may enhance memory. To set up this experiment, you would form an experimental group and a control group to manipulate whether participants would receive the drug, the IV. You would measure the effect of the drug by comparing the two groups' performance on, say, a memory task, the DV. However, if the experimental group receives a pill and the control group does not, you will not be able to successfully interpret better performance by the experimental group. Why? Because our expectations have a profound and well-documented effect on our responses. People receiving a pill of any sort will expect to experience change, and they will work harder to achieve the expected results. Given this extra effort, you would not know whether the drug caused the enhanced memory in the experimental group or whether the expectations created by taking that drug enhanced people's memory (Kirsch & Sapirstein, 1998). You could control for this, however, by giving a placebo pill, containing no active substances, to the control group. Now, because all participants in both groups receive a pill and neither group knows whether the pill contains active or inactive substances, you can be sure that the expectations produced by taking a pill did not account for any improvement in memory.

Let's return to our music example and review what we've accomplished so far. We are conducting an experiment to test this hypothesis: "Students assigned to listen to music each day in study hall will have higher average grades at the end of the quarter than students banned from listening." We have identified the independent variable as the presence or absence of music and created this variable by establishing an experimental group and a control group. We have randomly selected the participants for the experiment from the entire study hall population, so we can be sure that the sample is not biased and the results will apply to all study hall students. We randomly assigned the participants to the two groups to control for any individual differences among them, and we controlled for

other confounding variables by making sure the environmental conditions and expectation effects for the two groups are as similar as possible. The only thing we want to differ between the two groups is the IV—whether or not students listen to music—because we want to be able to conclude that there is a cause-and-effect relationship between music and end-of-quarter grades.

Data Analysis

Now we run the experiment and collect the data. Then we analyze the numbers, using statistics, to find out if the hypothesis is supported.

Let's say the average end-of-quarter grade for the experimental group is a B and for the control group is a C. Is this enough of a difference to conclude that there is a cause-and-effect relationship between listening to music (or not) and grades? Maybe. But what if the difference was between a B and a B–? How different must the values of the dependent variable be for the two groups? Perhaps you've heard the phrase *statistically significant*. Most researchers have agreed that we can consider a result statistically significant if the possibility that the difference between groups would occur by chance alone is no more than 5 percent. To determine this likelihood, we must consider three questions:

1. How big is the difference between the groups?
2. How uniform are the results within each group?
3. How many participants are in each group?

If we find a big difference *between* two large groups of students and small variations in results *within* each group (for example, mostly As and Bs in one group and mostly Cs and Ds in the other), we can be confident that the results are statistically significant.

The steps of the experimental method are summarized for you in **Table 2.2.**

Table 2.2

The Experimental Method Step by Step

1. Develop the *hypothesis.*
2. Create *operational definitions* for the *independent variable (IV) and dependent variable (DV).*
3. *Randomly select* a sample of participants from the population.
4. *Randomly assign* the participants to the *experimental and control groups.*
5. Expose the experimental group, but not the control group, to the IV. If necessary, use a *placebo* with the control group to balance expectations.
6. Control for other *confounding variables* by using a *double-blind procedure* and treating both groups the same except for exposure to the IV.
7. Learn the effect of the IV by measuring the DV for both groups.
8. Use *statistical analysis* to discover whether the difference in the DV between the two groups is likely to have been caused by the manipulation of the IV.

Replication

There is one other safeguard required for an experiment. Researchers must be able to **replicate** the results—that is, repeat an experiment to see whether the results can be reliably reproduced. Unless a study can be replicated, the results are likely to be a fluke occurrence. If an experimental result can be obtained only once, we must conclude that it was caused by some chance variable and not by the independent variable. This means there is no apparent cause-and-effect relationship between the IV and the DV. In our study hall experiment, replication studies might involve repeating the experiment at different schools or under slightly different conditions. Replication helps us know that the results apply in a variety of

replicate To repeat the essence of a research study to see whether the results can be reliably reproduced.

situations, and it underlines the importance of clear operational definitions for all our variables. It is no accident that our topic in this module is *re*search—not search. Researchers have to demonstrate their findings again and again and again!

PAUSE NOW OR MOVE ON

Turn to page 39 to review and apply what you've learned.

Research Ethics

WHAT'S THE POINT?

2-8 What ethical guidelines are in place to protect the rights of human research participants and animal research subjects?

There are ethical considerations with all research, especially when the participants are humans. These ethical issues extend well beyond the methodological issues we have been discussing so far. For moral reasons, many hypotheses cannot be tested experimentally, even though we could design sound experiments that would provide good answers. For example, suppose that you have a hypothesis that children who are disciplined by being whipped with a belt will not behave as well as children disciplined without physical punishment. This experiment would be quite simple to set up. The IV would be exposure to whippings, and the DV would be some measure of behavior, such as number of broken rules. You would then choose a sample of participants and randomly assign them to two groups. Those in the experimental group would be whipped by their parents, and those in the control group would be disciplined by their parents in other ways. Here we have a straightforward experimental design, but you can see why it would be unethical to conduct this experiment. You would be exposing your experimental group participants to a procedure that you believe would harm them.

Human Research

Most research takes place on university campuses, where ethics committees screen all research proposals in advance. The committee checks that the research will comply with the strict ethical guidelines for research with human participants set by the American Psychological Association (APA, 2002). There are four basic principles:

- *Informed consent.* Researchers must inform potential participants in advance about the general nature of the research and any potential risks involved. Participants must understand that they have a right to refuse to participate or to withdraw at any time.
- *The right to be protected from harm and discomfort.* Researchers may conduct studies that involve harm and discomfort only under certain circumstances and only with the participants' informed consent.

- *The right to confidentiality.* Researchers must never release data about individual participants, and members of the research team may not gossip or spread information about the participants.
- *The right to debriefing.* Participants must receive a full explanation of the research when their involvement is done. This is especially important if the research has included deception.

Animal Research

The four ethical principles discussed here help protect the rights of human research participants, but what about animals? We sometimes hear media reports of research that seems to subject animals to unwarranted cruelty, pain, and suffering. Why are animals used in research? What is done to protect them?

Psychologists use animals in research for several reasons:

- Many psychologists are simply interested in animal behavior. It is a fascinating and legitimate field of study.
- There are biological and behavioral similarities between animals and humans. Therefore, by studying animals, we can learn things that apply to humans.
- Because many species of animals develop more rapidly and therefore have shorter life spans than humans do, we can study genetic effects over generations much more rapidly in animals than in humans.
- It is often possible to exercise more control over experiments with animals than over those with humans. For example, researchers can observe animals 24 hours a day and control their diet completely. Humans usually will not agree to such conditions.
- Procedures that are not ethical to perform on humans may be considered acceptable when performed on animals. My sister-in-law once had a job in a medical laboratory, where she performed surgery on unclaimed dogs that had been slated to be killed at a local animal shelter. She tied off an artery and created heart attacks in these dogs so that researchers could run controlled tests of experimental drugs designed for human heart attack patients. Is it right to place the needs of humans above those of animals? It's a difficult question, but we live in a society where some animals (cows and chickens) are raised for food and others (rats and insects) are exterminated to reduce the threat of disease. Since it has given rise to so many valuable findings, supporters of animal research argue that it's permissible to use or even sacrifice animals for the good of humans.

So, what is done to protect animals from abuses? Federal legislation has been passed to protect animals used in research. This legislation, which has the support of the vast majority of researchers (Plous & Herzog, 2000), says that animals must have clean housing, adequate ventilation, and appropriate food and that they must be otherwise well cared for. Certain media accounts portraying animals in psychological research as "victims of extreme pain and stress, inflicted upon them out of idle curiosity" appear to be untrue. One study checked every animal study published in all of the APA's journals for five years (Coile & Miller, 1984). That study was unable to identify a single instance of abuse.

PAUSE NOW OR MOVE ON

Turn to page 40 to review and apply what you've learned.

Just as every marathon runner is also an athlete and every pianist is also a musician, every psychologist is also a scientist. This means psychologists use a particular set of research strategies to learn about behavior and mental processes. All the factual information you will read in this book was gathered using these research methods. Your knowledge of these methods will deepen your understanding of psychology and help prepare you to think critically in a world where research can (and should) drive many decisions. Now, what will you say when your school administrators announce that new study hall music policy?

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 2

Thinking About Research Strategies

Why Is Research Important?

WHAT'S THE POINT?

2-1 What advantage does research have over other ways of knowing things?

- Well-designed research produces data-supported conclusions.
- Research is better than common sense at providing reliable, logical answers to questions.

Apply What You Know

1. One advantage of the scientific method over other ways of understanding the world is
   a. the scientific method can answer any question.
   b. the scientific method leads to more reliable, reproducible answers.
   c. people are more likely to agree with scientific answers than other kinds of answers.
   d. scientific answers are more likely to fit with our common sense.
2. Briefly describe why it is important for all people to have an understanding of the scientific method.

Observation and Bias

WHAT'S THE POINT?

2-2 What are some ways that bias can influence research?

- Bias is any influence that unfairly increases the possibility that we will reach a particular conclusion.
- Research can be negatively influenced by a researcher's confirmation bias and by participant bias.

Apply What You Know

3. _____ bias exists when a researcher only looks for information that supports his or her point of view.
4. One way to minimize participant bias is to use _____ observation to collect data.

Case Studies

WHAT'S THE POINT?

2-3 Why do psychologists use case studies?

- Case studies collect in-depth information on a single person or situation. However, researchers cannot know from the case study alone if the conclusions are true for other people or situations.

Apply What You Know

5. If a researcher wanted to study a unique situation, such as a child growing up in a household in which four languages are spoken, what research method is most appropriate?
   a. case study
   b. survey
   c. correlational study
   d. cross-sectional study
6. Why must researchers be cautious about the results of a case study?

Correlation

WHAT'S THE POINT?

2-4 Why is it impossible to conclude cause-and-effect relationships from correlational data?

- A correlational study tells us the extent to which two variables are related. If the variables change in the same direction, then it's a positive correlation; if the variables change in opposite directions, then it's a negative correlation. Correlations do not establish that there is a cause-and-effect relationship between the two variables. We do not know if one of the two variables caused the change or even if a third variable caused the change in each of the correlated variables.

Apply What You Know

7. A _____ correlation exists when one variable increases while another variable decreases.
8. If variable A is correlated with variable B, what are the three possibilities in terms of cause and effect?

Surveys

WHAT'S THE POINT?

2-5 Why should we be cautious when applying data obtained from surveys?

- Surveys are an efficient way to collect information about people's attitudes or behaviors by asking questions on a questionnaire or in an interview. Researchers must be careful to construct unbiased questions and to use a random sample to draw adequate conclusions about their populations.

Apply What You Know

9. What is the most important caution you would give to a researcher interested in using a survey?
10. To be useful, a survey must be administered to a _____ sample pulled from a larger _____.

Longitudinal and Cross-Sectional Studies

WHAT'S THE POINT?

2-6 Why do psychologists conduct longitudinal and cross-sectional studies?

- These techniques allow psychologists to study how individuals change across the life span. Longitudinal studies follow the same group for many years. Cross-sectional studies compare people of different ages at one time.

Apply What You Know

11. _____ studies compare individuals from different age groups at one time.
12. Why are more cross-sectional studies conducted than longitudinal studies?

Experiments

WHAT'S THE POINT?

2-7 Why are experiments the most powerful research technique of all, and what factors contribute to the design of an experiment?

- Only experiments can establish cause-and-effect relationships. They do this by generating a hypothesis with operationalized independent and dependent variables, by randomly selecting participants and randomly assigning them to the experimental and control groups to control for confounding variables, and by controlling for other confounding variables relating to expectations and environmental differences.
- Data from experiments must be analyzed to reveal statistically significant conclusions.
- It must be possible to replicate experimental results before a cause-and-effect relationship can be concluded.

Apply What You Know

13. Why are placebos used in some experiments?
    a. They provide a way for the dependent variable to vary.
    b. They allow for statistical analysis of results.
    c. They are necessary for observational studies.
    d. They help control for some confounding variables.
14. Explain why random assignment is a critical feature of experimental design.

Research Ethics

WHAT'S THE POINT?

2-8 What ethical guidelines are in place to protect the rights of human research participants and animal research subjects?

- Ethical guidelines for research require that human participants have the rights of informed consent, protection from harm, confidentiality, and debriefing.
- Federal guidelines protect the health and safety of animals used in research.

Apply What You Know

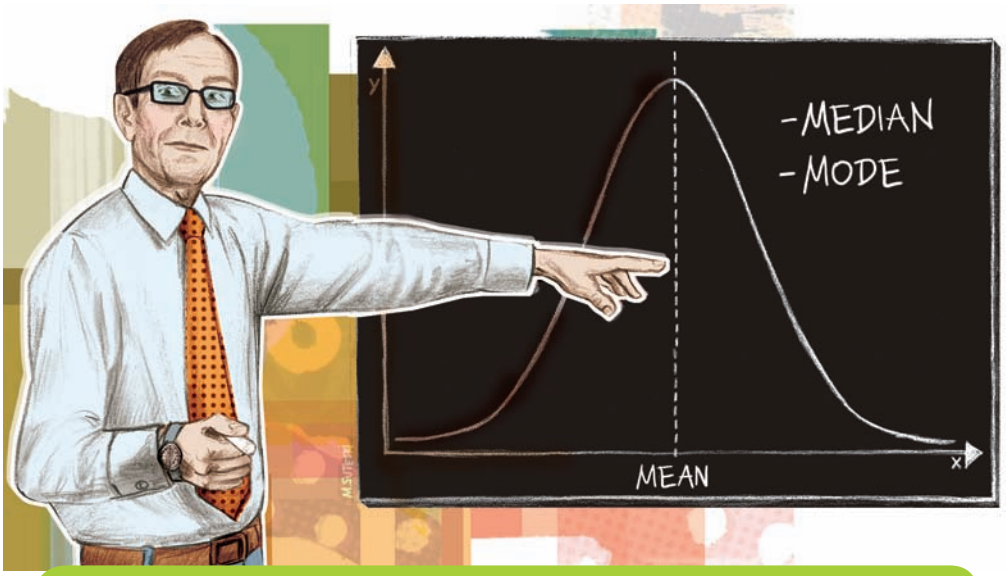
15. _____ occurs when a research participant knows the general nature of the research and agrees to participate.
16. _____ is when a participant receives a full explanation at the conclusion of the research.

KEY TERMS

scientific method, p. 21
confirmation bias, p. 23
critical thinking, p. 24
participant bias, p. 24
naturalistic observation, p. 24
case study, p. 25
correlational study, p. 25
survey method, p. 27
population, p. 28
random sample, p. 28
longitudinal study, p. 28
cross-sectional study, p. 28
experiment, p. 29
hypothesis, p. 29
operational definition, p. 29
independent variable (IV), p. 30
dependent variable (DV), p. 30
experimental group, p. 31
control group, p. 31
random assignment, p. 32
confounding variable, p. 32
double-blind procedure, p. 34
placebo, p. 34
replicate, p. 35

MODULE 3

Psychology's Statistics



Psychologists use statistics to make data more meaningful and useful.

Frequency Distributions

Measures of Central Tendency
- Mode
- Mean
- Median

Measures of Variation
- Range
- Standard Deviation

Normal Distribution

Comparative Statistics

Correlation Coefficient

Statistical Inference

Statistics are more a matter of attitude than numbers. Many people (not *you,* of course) have a negative view of statistics and convince themselves that this is a topic beyond comprehension. Maybe it's the word—*statistics* is hard to pronounce! The concepts themselves are really not so hard. Lots of people enjoy the subject, and there is no denying its usefulness. Think of trying to participate in a fantasy sports league, or a real sports league for that matter, without the presence of statistical data to guide your decisions or to determine winners and losers. Think of all the advertisers that try to sway consumers with statistics they say prove their product is best. A lack of understanding of statistical processes puts you at a serious disadvantage because statistical information is all around us. Television, newspapers, magazines, and the Internet are all full of statistical data. Some people do use statistics accurately and appropriately, but others use statistics inappropriately because of lack of knowledge or in an effort to deliberately mislead. To think critically about all the information bombarding you, you'll need to sort the good stuff from the bad. Educated people need statistical literacy as much as computer literacy.

Statistics may seem difficult at first simply because this is a new way of looking at things. Riding a bike or driving a car seems hard the first time you try, too. Think of the first time you went bowling, the first time you picked up a musical instrument, or

the first time you attempted a new computer game. These were all significant challenges the first time around. If you're like most people, you're willing to work hard to learn something, despite the initial difficulty, if you believe in an activity's value. And statistics does have value—your efforts to understand will arm you with tools that will help you think critically about lots of choices you'll be making in life. So, stick around and take our guided tour of this important area.

Before we begin, take note of this key concept: *The purpose of statistics is to make data meaningful.* If a friend told you she got 27 questions right on her history test, how meaningful would that be? Wouldn't you also need to know how many items were on the test? If she got 27 right out of 30, that's great, but if she got 27 out of 100. . . . Well, you get the picture. And isn't it also important to know how other students did? Even if she did score 27 out of 30, that may have been the lowest score in the class on a very easy test. Or 27 out of 100 could be a good score if it was the highest score in the class on an exceptionally difficult test. Statistics are an important extension of critical thinking. They provide a method for organizing information so that we can understand what a number really means.

To illustrate the statistics we discuss, we'll rely on an example we used in Module 2 to demonstrate research strategies: How would banning the use of music players affect student learning in study halls? To find out, we designed an experiment with two groups (see **Figure 3.1**). The experimental group contained students assigned to listen to music while in study hall; the control group contained students who were not allowed to listen to music while there. We decided to measure the effect of listening to music (our independent variable) by examining the two groups' average end-of-quarter grades (our dependent variable). We settled on a hypothesis that the experimental group students, who listened to music, would have higher grades at the end of the quarter than the control group students, who did not listen to music.

Statistical Literacy

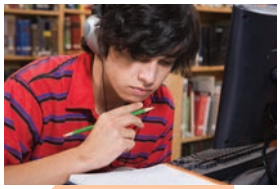
People in modern society need to understand statistics well enough to make informed decisions about data presented in the media. The number of runs scored by a baseball player could be influenced by his batting average, the number of bases he steals, or his position in the batting order.

© DANIEL BENDJY/ISTOCKPHOTO

All study hall students

40 students randomly selected

20 students randomly assigned to experimental group



Listen to music daily in study hall

Average grades at the end of the quarter

20 students randomly assigned to control group

Music not allowed in study hall

Average grades at the end of the quarter

Figure 3.1
Design for Music Experiment

The purpose of this experiment, fully explained in Module 2, is to determine whether or not students who listen to music during study hall will have higher grades.

Frequency Distributions

WHAT'S THE POINT?

3-1 What can we learn from frequency distributions?

A **frequency distribution** is, quite simply, a list of scores ordered from highest to lowest. Figure 3.2 shows some possible data from the hypothetical experiment, before and after being made into an ordered list. Do you notice

Grades, in random order		Frequency distributions	
No music	Music	No music	Music
80	64	97	94
58	83	93	92
97	75	93	87
77	72	89	83
93	92	89	82
69	68	84	79
67	87	84	77
89	79	84	75
93	94	80	74
78	74	78	72
84	82	77	71
73	77	73	69
84	68	69	68
84	71	67	68
89	69	58	64

Figure 3.2
Frequency Distributions

Putting scores in order creates a frequency distribution and makes the raw data more meaningful.

frequency distribution A list of scores ordered from highest to lowest.

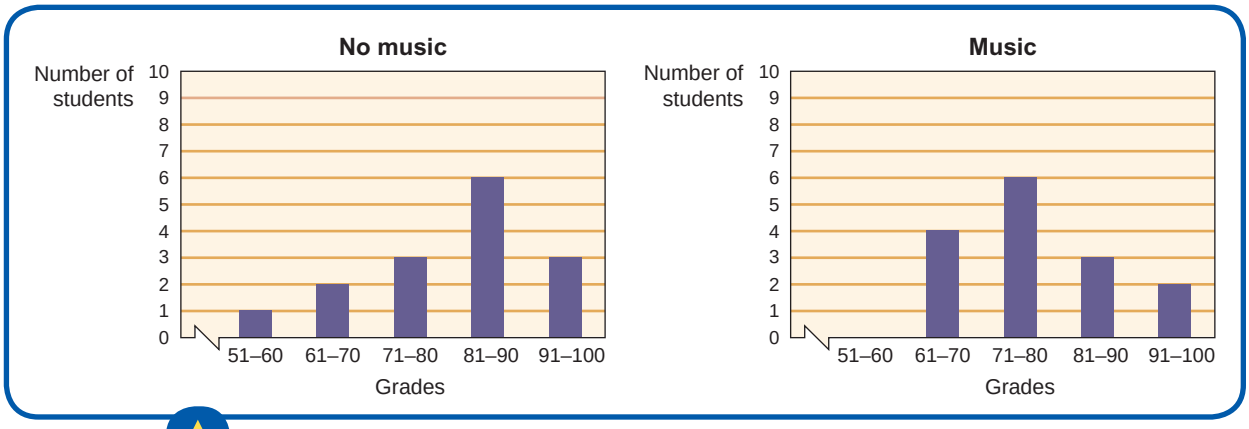


Figure 3.3
Bar Graphs

Data from a frequency distribution can easily be converted to a bar graph.

how much more useful these numbers are after we arrange them in a frequency distribution from highest to lowest? At a glance, you can tell the high score for each group and the low score for each group.

The information from the frequency distribution can be easily presented as a graph, like the bar graphs in **Figure 3.3.** By viewing our scores this way, we can discover the meaning behind the numbers even more easily because we can see at a glance how the scores cluster and what the most common scores are.

PAUSE NOW OR MOVE ON

Turn to page 55 to review and apply what you've learned.

Measures of Central Tendency

WHAT'S THE POINT?

3-2 What are the three measures of central tendency?

The next thing we need to know about a frequency distribution is where its center—the "normal" score—is. For the study hall research, we have two groups—one that listens to music and one that does not—and you just learned how to create a frequency distribution for each. If the center of one frequency distribution is higher than the center of the other, this may help us decide whether the hypothesis is correct. It seems as though there should be some easy and reliable way to determine the center. However, it isn't quite this simple. There are three methods—*mode, mean,* and *median*—and each is appropriate only in certain situations.

Mode

mode The most frequently occurring score or scores in a distribution.

The **mode** is the most frequently occurring score or scores in a distribution. Using the sample data from our frequency distributions, we can see that the mode for the music group is 68 and the mode for the no-music group is

	No music	Music
Mode (Most common)	84	68
Mean (Average)	$\frac{1215}{15} = 81$	$\frac{1155}{15} = 77$
Median (Middle score)	84	75

Figure 3.4
The Three Measures of Central Tendency

The three primary methods of finding the center of a distribution of scores are the mode, mean, and median. Each has its own strengths and weaknesses.

84 (see **Figure 3.4**). Modes are not the most ideal source of information—at least for our purposes here. It's possible for the most common score (the mode) to *not* be near the center of the distribution. For example, I once gave a test to my students on which almost everyone did either very well or very poorly; the most frequent scores did not represent the center of the distribution. The mode is most useful when the data can only be put into distinct groups. For example, if you were categorizing people as male or female—by assigning males the number 1 and females the number 2—it would not make any sense to say that the average sex for the group was 1.5. When the numbers represent distinct groups, the mode is the only appropriate way to establish central tendency. Here's another example: If a high school had 100 sophomores, 200 juniors, and 150 seniors, the mode would be grade 11, the group with the largest number. In finding the center of this distribution, the best you can do is use the mode and say that the most common student is a junior.

Mean

The most familiar measure of central tendency is the **mean,** the mathematical *average* of a distribution. As you know, we compute averages by adding all the scores and dividing by the total number of scores. The means for the two groups in the music study are presented in Figure 3.4—81 for the no-music group and 77 for the music group. Under most circumstances, the mean is the statistic of choice for central tendency.

Sometimes, however, the mean can mislead us. This occurs when a few scores are either extremely high or extremely low. It's not a good idea to use the mean, for example, to report the central tendency for housing costs in a community because most communities have a few very valuable homes. When you calculate a mean, these few expensive homes will affect the mean much more than each of the moderately priced homes will. As a result, housing will appear to be more expensive than it really is.

Median

The third measure of central tendency is the **median,** the middle score in a ranked distribution; half of the scores are above the median and half are below. To remember this, just think of the median of a rural interstate highway, usually a strip of grass running down the center of the highway between the two sets of lanes. An extreme score in the top or bottom half of

mean The mathematical average of a distribution, obtained by adding the scores and then dividing by the number of scores.

median The middle score in a ranked distribution; half the scores are above it, and half are below it.

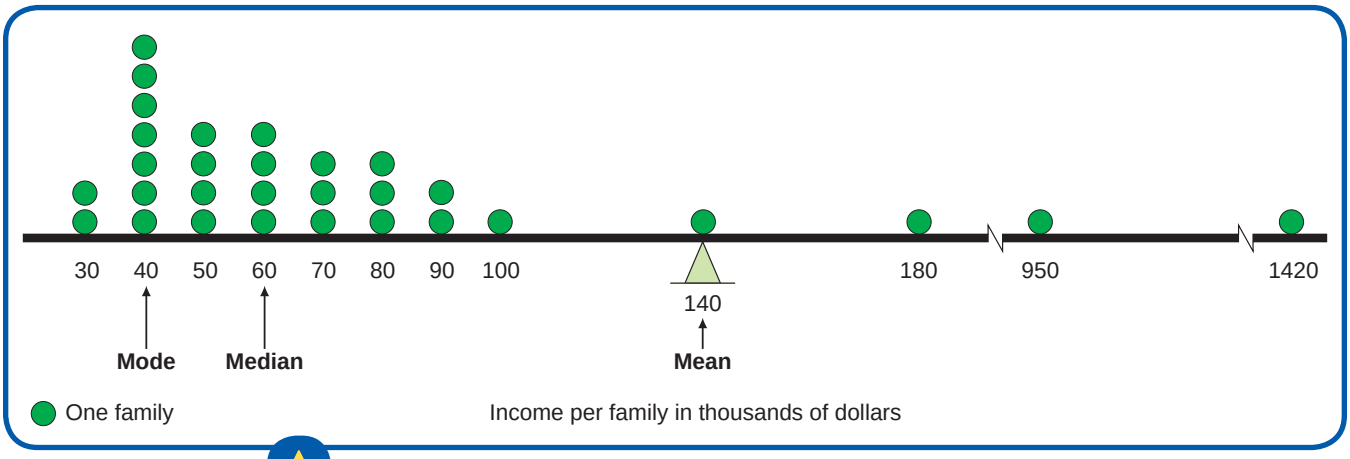


Figure 3.5
Central Tendency in a Skewed Distribution

This diagram shows the three measures of central tendency for a distribution of incomes skewed by a few families with very high incomes. Notice that, under these circumstances, the mean (which, as the average, "balances" the distribution) produces a result that is far above what most people would consider the center of this distribution. In cases like this, the median is probably a better representation of central tendency because it is less influenced by skew.

the distribution will have no greater effect than any other score. Figure 3.4 also shows the median for the students who listen to music (75) and students who don't (84).

When the mean, median, and mode are all the same, it's easy to identify central tendency. The three measures of central tendency can, however, be vastly different. **Figure 3.5** shows what can happen when a distribution is distorted, or **skewed**—not evenly distributed around the mean. In a skewed distribution, there is an unusual number of high scores or low scores.

PAUSE NOW OR MOVE ON

Turn to page 55 to review and apply what you've learned.

Measures of Variation

WHAT'S THE POINT?

3-3 How do we determine the variation of a distribution of scores?

It is important to have a sense of where the center of a distribution falls. To truly understand the meaning of the numbers, however, we need to add another piece of the puzzle. Two distributions can have the same center and still be different. Consider a school "Cs-Only Club" that was open only to people who got a grade of C in every class they took. The mode for this club's grades would be C. The mean and median grades would also be C. But can you now imagine a situation in which *all* students in a school were invited to join an "Everybody's Welcome Club" and the mode, mean, and median for the grades would still be a C? The B students would balance the D students, and the A students would balance the failing students. The students in the "Cs-Only Club" are packed together at the same point on the grade distribution. The students in the "Everybody's Welcome Club" are spread throughout the distribution. These differences are represented in **Figure 3.6.** In this section, we examine ways to measure how spread out scores are.

skewed Distorted; not evenly distributed around the mean.

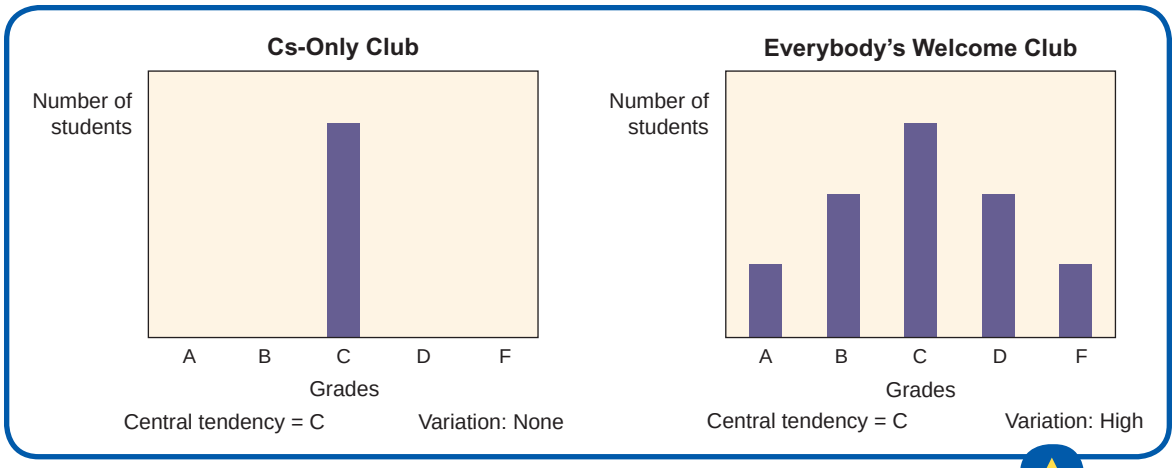


Figure 3.6
Variation Makes a Difference

Both of these bar graphs represent distributions of students in which the measures of central tendency are C grades. It's clear, however, that the distributions are different. For the "Cs-Only Club," there is no variation; for the "Everybody's Welcome Club," there is high variation. Measures of variation allow us to understand such differences.

Range

The simplest measure of variation is the **range,** or the difference between the highest and the lowest scores in a distribution. The range is a simple, often helpful, indicator of how much variation there is in a distribution. It's nice to know, for example, that the range of grades for the music group was 30 (from a high of 94 to a low of 64 points) and that the range for the no-music group was 39 (97 to 58). The only problem with this measure is that a range considers only two scores: the highest and the lowest. Let's assume for a minute that the student who got a 58 in the no-music group missed a lot of school because of illness. This already marginal student's grade might easily have dropped to a 38 because of the absences. A change in this one student's grade could add 20 points to the range! A better statistic would consider *every* score, not just the two extremes. That's where the standard deviation comes in.

Standard Deviation

Standard deviation is a statistic that tells us how much scores vary around the mean score of a distribution. The higher the standard deviation, the more spread out the scores are; the smaller the standard deviation, the more closely the scores are packed near the mean. In fact, if a distribution had a standard deviation of zero, it would signify that *every* score was the mean score—there would be no variation at all! This would happen in the "Cs-Only Club." The standard deviation would be zero because every grade would be the average grade of C. The "Everybody's Welcome Club" would have a higher standard deviation because its members have a variety of grades.

Figure 3.7 shows an example of how the standard deviation is calculated for a small set of scores (in this case, punting distances for a football player). It is a logical process, and you should take a careful look to see how it is done. However, the important thing to understand here is the meaning behind the statistic. When you compute the standard deviation, you are coming up with a number that represents how far the scores spread from the mean. If there were two punters on my team who both have a mean of 40 yards, the punter with the smaller standard deviation is the one who is most consistent.

range The difference between the highest and lowest scores in a distribution.

standard deviation A computed measure of how much scores vary around the mean score of a distribution.

Figure 3.7
Calculating Standard Deviation

Here is how to calculate the standard deviation of a small set of scores.

1. Calculate the mean	2. Determine deviation from the mean (40 yards)	3. Square the deviations
36 yards	–4 yards	16 yards^2
38 yards	–2 yards	4 yards^2
41 yards	+1 yard	1 yard^2
45 yards	+5 yards	25 yards^2
Mean = $\frac{160}{4}$ = 40 yards		46 yards^2 = Sum of (deviations)^2

4. Take the square root of the mean of column 3

$$\text{Standard deviation} = \sqrt{\frac{\text{Sum of (deviations)}^2}{\text{Number of punts}}} = \sqrt{\frac{46 \text{ yards}^2}{4}} = 3.4 \text{ yards}$$

Steps in Calculating the Standard Deviation

1. Calculate the mean.
2. Determine how far each score (punt distances, in this example) deviates (differs) from the average.
3. Square the deviation scores and add them together. Note that you cannot just average the deviations without squaring them because the sum of the deviation scores will always be zero.
4. Take the square root of the average of the squared deviation scores. This step brings you back to the original units—yards rather than yards squared.

Calculating the standard deviation by hand would be tedious if you have more than just a few scores. Thank goodness for calculators and computer spreadsheets that will do the job with a few pushes of a button or clicks of a mouse. My computer tells me that the standard deviation for our music group is 8.7 points and the standard deviation for the control group is 10.5 points. This means that the scores for the music listeners are packed a little closer together. In other words, there is less variation among the grades of the music listeners than there is for those who weren't allowed to listen to music in study hall.

PAUSE NOW OR MOVE ON

Turn to page 55 to review and apply what you've learned.

Normal Distribution

WHAT'S THE POINT?

3-4 What are the important characteristics of a normal distribution?

normal distribution A frequency distribution that is shaped like a symmetrical bell.

Much psychological data can be represented in a graph called a **normal distribution,** a frequency distribution shaped like a symmetrical bell. In a normal distribution, most scores fall near the mean with fewer scores at the extremes. A normal distribution, like the one in **Figure 3.8,** is not skewed; its left and right sides are mirror images of each other. Furthermore, the high point of a normal

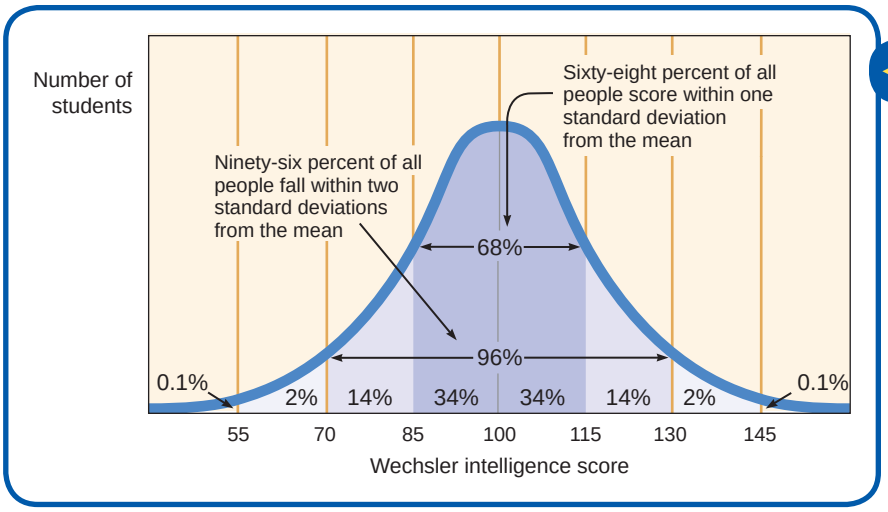


Figure 3.8
A Normal Distribution or Bell-Shaped Curve

Intelligence test scores form a normal distribution with a mean of 100 points and a standard deviation of 15 points. The percentage figures shown are true for *any* normal distribution, not just for intelligence scores.

distribution is in the center. This high point represents all three measures of central tendency: the mode, the mean, and the median. Many collections of data produce a normal distribution. In intelligence test scores, for example, most people "pile up" at or near the middle of the distribution. The further you move above or below the mean, the fewer people are represented. This distinctive pileup produces the bell shape of the normal distribution.

Data distributed in a bell-shaped curve illustrate some useful principles. Let's take a look at scores on intelligence tests. Scores on the Wechsler intelligence tests (the most widely used family of tests) produce a mean score of 100 points and a standard deviation of 15 points. This means that a person with a score of 115 is one standard deviation above average on this test. A person with a score of 80 falls about 1.33 standard deviations below average. There are some remarkable consistencies about normally distributed data. The most important things to remember, illustrated in Figure 3.8, are these:

- Approximately 68 percent of the population will fall within one standard deviation of the average. In the case of the Wechsler test scores, this means that 68 percent of the population scores between 85 (one standard deviation below average) and 115 (one standard deviation above average). In other words, roughly two-thirds of any normal population falls in this range.
- If you move one more standard deviation on both sides of the mean, you have now accounted for about 96 percent of any normal population. In other words, about 24 out of 25 people fall within two standard deviations of the mean. For the Wechsler test scores, this represents the spread from a score of 70 (two standard deviations below average) to a score of 130 (two standard deviations above average).
- By the time you've gone one more standard deviation, you've included just about everyone. Slightly more than 99.7 percent of any normal population falls within three standard deviations of the mean. For the Wechsler test

Marilyn vos Savant

Marilyn vos Savant, who writes a Sunday puzzle column for *Parade* magazine, was once listed by the *Guinness Book of World Records* as the person with the highest intelligence test score. Guinness no longer maintains this category because the scores are not reliable enough to determine a single "winner." Her score was reported to be over 220. If true, this would put her over eight standard deviations above average, truly astonishing when you realize that only 0.3 percent of the population is more than three standard deviations away from average!

ERIKA LARSEN/REDUX

percentage A comparative statistic that compares a score to a perfect score of 100 points.

percentile rank A comparative statistic that compares a score to other scores in an imaginary group of 100 individuals.

scores, this is the range from a score of 55 to a score of 145. Statistically, then, it is very unusual for people to have Wechsler test scores below 55 or above 145. No matter what is being tested, in a normal distribution, it is unusual for any individual to exceed three standard deviations from the mean in either direction.

PAUSE NOW OR MOVE ON

Turn to page 55 to review and apply what you've learned.

Comparative Statistics

WHAT'S THE POINT?

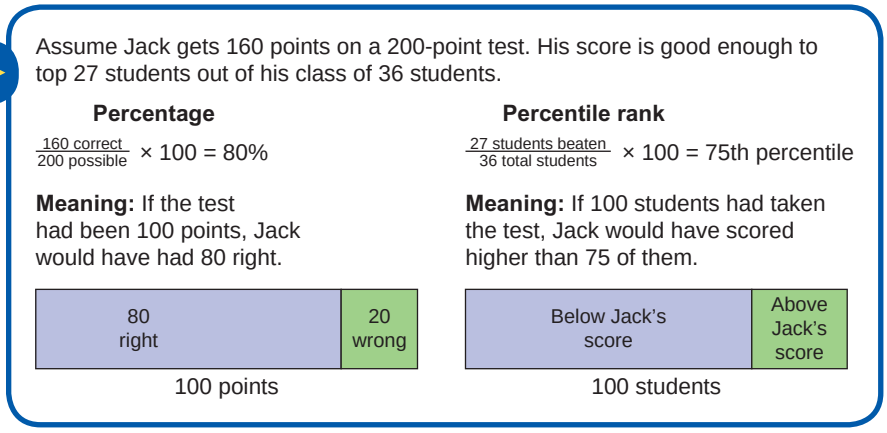
3-5 What is the difference between percentage and percentile rank?

The two major *comparative statistics* are percentage and percentile rank. **Percentage,** as you probably know, compares a score to a perfect score of 100 points. If a student scores 83 percent on a test, for example, that student would have had 83 right on a test with 100 questions.

The **percentile rank** compares one score with other scores in an imaginary group of 100 individuals. Percentile rank tells you where a particular score stands in that group and how many people had equal or lower scores. If our student scores at the 83rd percentile, it means that score would have equaled or exceeded the score of 83 of every 100 people who took the test. **Figure 3.9** shows an example of how percentages and percentile ranks are calculated.

Figure 3.9
Calculating Percentage Scores and Percentile Ranks

These two common comparative statistics have similar names and are calculated with similar formulas, but they have different meanings.


Assume Jack gets 160 points on a 200-point test. His score is good enough to top 27 students out of his class of 36 students.
Percentage
160 correct / 200 possible × 100 = 80%
Meaning: If the test had been 100 points, Jack would have had 80 right.
80 right
20 wrong
100 points
Percentile rank
27 students beaten / 36 total students × 100 = 75th percentile
Meaning: If 100 students had taken the test, Jack would have scored higher than 75 of them.
Below Jack's score
Above Jack's score
100 students

PAUSE NOW OR MOVE ON

Turn to page 56 to review and apply what you've learned.

Correlation Coefficient

correlation coefficient A statistical measure of the strength of the relationship between two variables.

WHAT'S THE POINT?

3-6 What does the correlation coefficient indicate about the relationship between variables?

Another highly useful statistic is the **correlation coefficient,** a statistical measure of the strength of the relationship between two variables. Variables can be related in two ways—positively or negatively. If both variables increase (or decrease) together, there is a *positive correlation.* An example of a positive correlation is the one between a weight-lifting conditioning program and strength: Lift more, grow stronger. *Negative correlations* involve two variables that change in opposite directions—one variable increases as the other decreases. There is a negative correlation between tooth flossing and dental decay: Floss more, have fewer cavities.

The calculation of a correlation coefficient is quite complicated, and we won't go through it here. What's important to remember is that the number produced by the calculation has a value that always falls between –1.00 and +1.00. When $r = -1.00$ (the letter r stands for correlation coefficient), we have a perfect negative correlation. Every time one variable increases by a certain amount, the other variable would decrease by an equally certain amount. **Figure 3.10a** shows a perfect negative correlation (–1.00).

If $r = +1.00$, we are looking at a perfect positive correlation between two variables. Every time one variable increases by a certain amount, the other variable also increases by an equally certain amount. Similarly, every time one variable decreases by a certain amount, the other variable decreases by an equally certain amount (see **Figure 3.10b**).

If $r = 0.00$, there is no correlation whatsoever between two variables. Examples of this seem quite silly, like the relationship between flossing teeth and the temperature in Mexico City, or the relationship between the Los Angeles Lakers' basketball scores and the number of late arrivals into London's

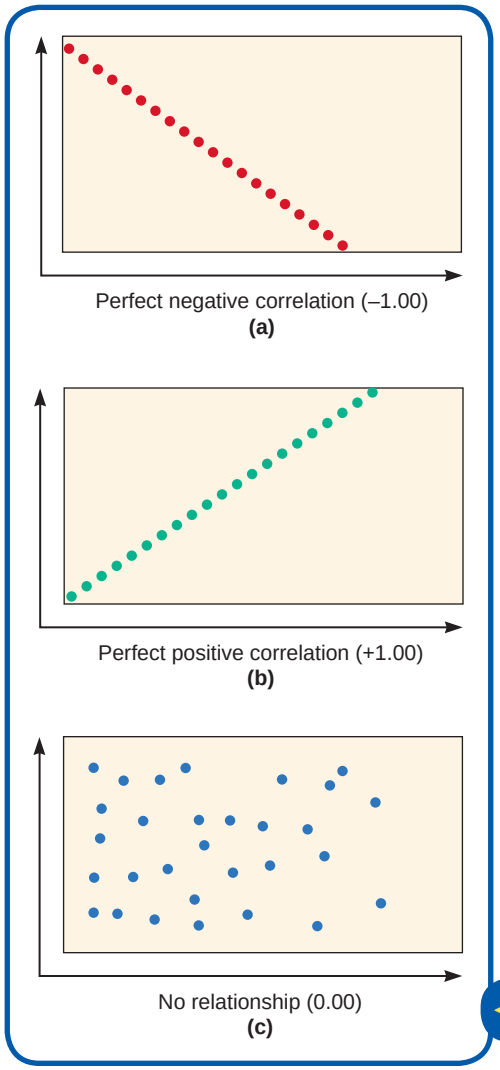


Figure 3.10
Correlations

Graph (a) displays a perfect negative correlation ($r = -1.00$). Each time the variable represented on the vertical axis increases by a certain amount, the variable on the horizontal axis decreases by an equally certain amount. Graph (b) shows a perfect positive correlation ($r = +1.00$); the variables represented on the two axes increase in exact proportion. In graph (c), there is no correlation ($r = 0.00$). The random dots show that the two variables are not related.

Positive Correlation

In a positive correlation, both variables increase (or decrease) together. The more this person trains, the stronger she will become.

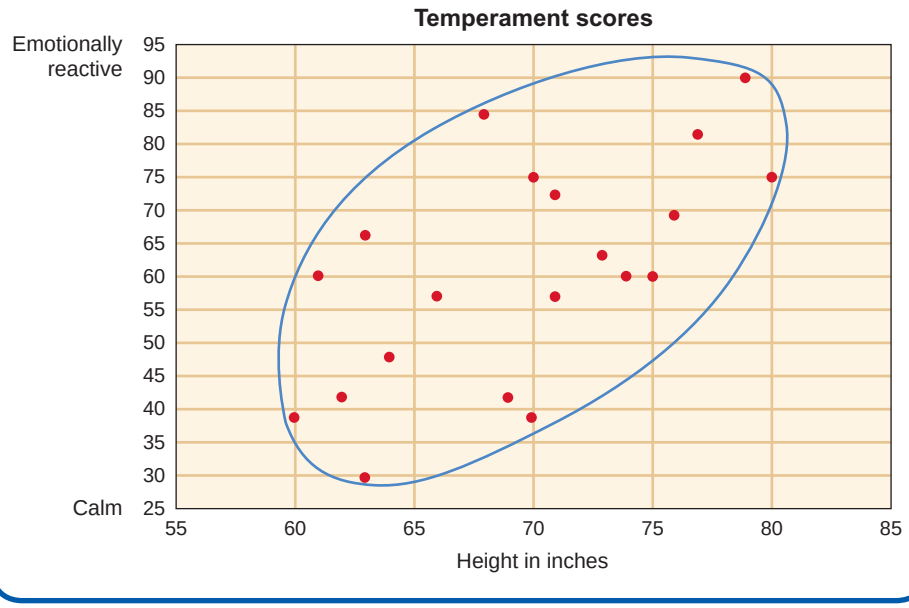
ROBERT MARMION/ALAMY IMAGES

Heathrow Airport. When the first variable changes, we know nothing about what the second variable will do. When graphed, no relationship is apparent, as you can see in **Figure 3.10c**.

We've now illustrated three situations: a perfect negative correlation, a perfect positive correlation, and no correlation at all. As you might imagine, the real world is rarely so neat and tidy. Positive correlations are usually less than $r = +1.00$, and negative correlations don't often reach $r = -1.00$. **Figure 3.11** shows you what a graph, called a *scatterplot,* would look like in a more realistic correlation between two variables—height and temperament.

Figure 3.11
Scatterplot of a Moderately Positive Correlation

These sample data show that taller people are somewhat more likely to be emotionally reactive than shorter people.



PAUSE NOW OR MOVE ON

Turn to page 56 to review and apply what you've learned.

Statistical Inference

WHAT'S THE POINT?

3-7 What does it mean when a researcher reports that a research finding is statistically significant?

inferential statistics Statistics that can be used to make a decision or reach a conclusion about data.

statistical significance A statistical statement of how likely it is that a result occurred by chance alone.

Most of the statistics we've discussed so far are *descriptive statistics*. They describe data in a way that makes them more meaningful. Another kind of statistics—**inferential statistics**—lets us make decisions or reach conclusions about data. Inferential statistics give psychologists guidelines for deciding whether data support hypotheses. Because inferential statistics are more complicated than descriptive statistics to calculate and interpret, we provide only a general discussion here.

Let's return, one last time, to our music example. (Will you miss it?) Assume we've collected grade data from the two groups: the experimental group, whose members did listen to music, and the control group, whose members did not. Recall Figure 3.4, which presents the measures of central tendency we calculated. You can see that the music group did not perform quite as well as the no-music group. By the end of the experiment, there was a 4-point difference between the means of the two groups (81 for the no-music group and 77 for the music group). The key question is whether this difference is **statistically significant,** a statistical statement of how likely it is that a result occurred by chance alone. In other words, does the 4-point difference represent a real difference, one that would be reflected in real-world conditions? Or is it simply the result of chance—a matter of "luck" that can be accounted for by some difference between our two groups (say, in study skills) despite our efforts to make them the same by using random assignment? We will never know with 100 percent certainty, but we can know how likely it is that this difference is statistically significant.

Most psychologists are willing to accept up to a 5 percent likelihood that an experiment's results did not occur by chance. This means being at least 95 percent sure that a difference in results is because of the manipulation of the *independent variable,* which in this case was whether or not students listened to music, and not some other unknown variable. A series of calculations with our results in the imaginary music experiment would tell us that with our 4-point difference we can be about 40 percent sure that the headphones caused the difference in scores. So, this is not even close to a statistically significant result. For the difference to be statistically significant, the two groups would have to be more clearly separated, with a larger difference or less overlap between them.

There are a number of factors involved in inferential statistics. Here are the three most important:

- *The difference between the two groups' means.* If the means are far apart, the result is more likely to be statistically significant.
- *The number of participants.* If each group has only a few people, the results are not as likely to be statistically significant as they would be if each group has a large number of randomly selected people in it.

- *The standard deviation of the two groups.* If the scores of both groups are mostly packed close to the means, the means don't need to be separated by as much to produce a statistically significant result. If the scores are widely spread (represented by high standard deviations), the two groups are likely to overlap quite a bit. Many participants will score in the same "overlap range" no matter which group they are assigned to, and the result is not likely to be statistically significant. This is illustrated in **Figure 3.12.**

There is much to know about statistics, and much of it is beyond the scope of an introductory psychology course. This module has been just a brief introduction. Each formula is a logical application of accepted procedures that can be organized in a series of straightforward steps. The main point to remember is that we use statistics to make research results meaningful. The more you know about statistics, the better equipped you will be to critically evaluate information. Whether it's sports league player stats or advertisers' product claims, making sense of statistics in the world around you is a lifelong valuable skill.

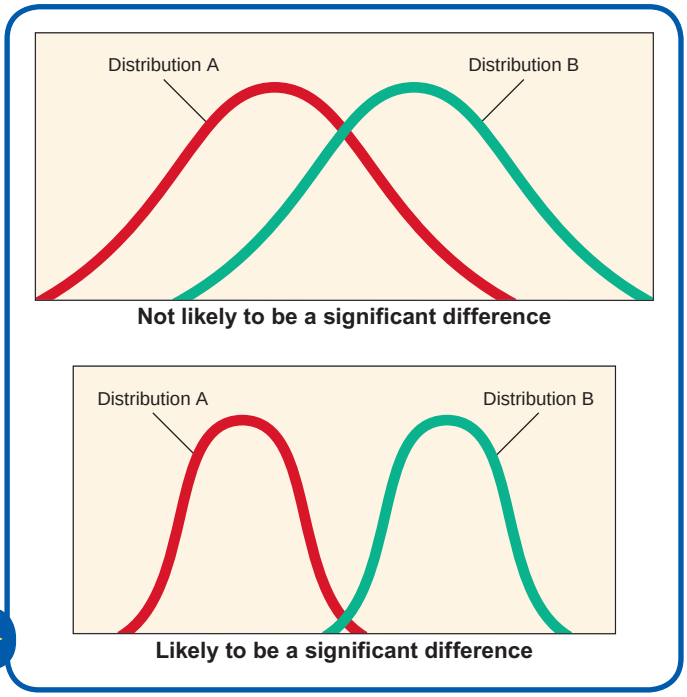


Figure 3.12
Statistical Significance

A research result is statistically significant when it is unlikely that the result occurred by chance. Furthermore, when two distributions show little overlap, the difference between them is more likely to be statistically significant.

PAUSE NOW OR MOVE ON

Turn to page 56 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 3

Thinking About Psychology's Statistics

Frequency Distributions

WHAT'S THE POINT?

3-1 What can we learn from frequency distributions?

- A frequency distribution lists a range of scores from highest to lowest and can be easily presented in a graph.

Apply What You Know

1. Which of the following is an example of a frequency distribution?
   a. a baseball team roster, organized by jersey number
   b. an alphabetized grocery list
   c. a list of quiz scores from a class, in order from highest to lowest
   d. a list of ingredients and amounts in a chocolate chip cookie recipe
2. What is the advantage of creating a frequency distribution?

Measures of Central Tendency

WHAT'S THE POINT?

3-2 What are the three measures of central tendency?

- The mode is the most frequent score or scores in a set of scores.
- The mean is the mathematical average of the set of scores.
- The median is the score in the middle of the frequency distribution.

Apply What You Know

3. The _____ is the average of a set of numbers.
4. The median is generally a better representation of the center of a distribution when the distribution is distorted, or _____, by some unusually high or low scores.

Measures of Variation

WHAT'S THE POINT?

3-3 How do we determine the variation of a distribution of scores?

- Two ways of looking at the variation of a set of scores are to examine the range (the difference between the highest and the lowest scores) and examine the standard deviation (how the scores are distributed around the mean).

Apply What You Know

5. The standard deviation is a good way to get a sense of the _____ of a distribution of scores.
   a. consistency
   b. center
   c. accuracy
   d. reasonableness
6. Two measures of variation are the standard deviation and the _____.

Normal Distribution

WHAT'S THE POINT?

3-4 What are the important characteristics of a normal distribution?

- A graph of a normal distribution is shaped like a symmetrical bell, with most scores falling near the mean and fewer scores at the extremes.
- Of the scores, 68 percent are within one standard deviation of the mean, 96 percent are within two standard deviations, and 99.7 percent are within three standard deviations.

Apply What You Know

7. If you know that scores on an exam in a class are normally distributed, then you know that about _____ of the class scored within one standard deviation of the average score on the exam.
   a. 96 percent
   b. 99.7 percent
   c. 50 percent
   d. 68 percent
8. Over _____ percent of all scores fall within three standard deviations of the mean.

Comparative Statistics

WHAT'S THE POINT?

3-5 What is the difference between percentage and percentile rank?

- Percentage refers to a comparison between a score and a perfect score of 100 points (for example, dividing the number of points earned on an exam by the number of possible points produces the percentage).
- Percentile rank explains where a score falls in an imaginary group of 100 individuals (for example, if your percentile rank on a test is 80, you scored at or better than 80 percent of the people who took the exam).

Apply What You Know

9. Which comparative statistic compares your score to the performance of other people?
10. Which comparative statistic compares your score to the perfect score?

Correlation Coefficient

WHAT'S THE POINT?

3-6 What does the correlation coefficient indicate about the relationship between variables?

- A correlation coefficient is a number (represented by *r*) between –1.00 and +1.00 that indicates the strength of a statistical relationship between two variables.
- Positive correlations indicate that as one variable increases, it is likely that the other variable will increase.
- Negative correlations indicate that as one variable increases, it is likely that the other variable will decrease.

Apply What You Know

11. What does it mean to say that the correlation coefficient is about 0.00?
12. Which of the following pairs of variables is likely to have an *r* value between 0.00 and –1.00?
    a. height and IQ scores
    b. studying and GPA
    c. standard deviation and measures of central tendency
    d. smoking and life span

Statistical Inference

WHAT'S THE POINT?

3-7 What does it mean when a researcher reports that a research finding is statistically significant?

- Statistical significance indicates that a research finding is most likely the result of the variable the researcher is studying, not random chance.

Apply What You Know

13. Statistically significant results are not likely to be caused by _____.
14. Which of the following factors has the most influence on whether a result is statistically significant?
    a. the experience of the researcher
    b. the difference between the two groups' means
    c. the accuracy of the measurements
    d. whether the results have been placed in a frequency distribution

KEY TERMS

frequency distribution, p. 43
mode, p. 44
mean, p. 45
median, p. 45
skewed, p. 46
range, p. 47
standard deviation, p. 47
normal distribution, p. 48
percentage, p. 50
percentile rank, p. 50
correlation coefficient, p. 51
inferential statistics, p. 53
statistical significance, p. 53

DOMAIN 2

Biopsychology

Biological Bases of Behavior

MODULE 4 The Nervous System and the Endocrine System

MODULE 5 The Brain

Sensation and Perception

MODULE 6 Sensation

MODULE 7 Perception

Consciousness

MODULE 8 Sleep, Dreams, and Body Rhythms

MODULE 9 Psychoactive Drugs

MODULE 10 Hypnosis and Other States of Consciousness

If you wanted to learn about cooking, one way to start would be to learn about kitchens. If you wanted to learn about transportation, one way to start would be to learn about cars. Likewise, to learn about the mind and behavior, one way to start is to learn about the body. Our biology both enables and limits our ability to behave, think, and feel.

The modules in the biopsychological domain are the "nuts and bolts" of psychology. Our topics—the nervous and endocrine systems, the brain, sensation, perception, sleep, dreams, body rhythms, psychoactive drugs, hypnosis, and other states of consciousness—all attempt to explain different aspects of how the human "machine" functions. Just as we can partially understand transportation by studying a car, we can partially understand mind and behavior by studying the body.

In the seven modules in the biopsychological domain, we often use two words—stimulus and response. A *stimulus* is anything you can respond to—the sight of an object, the smell of cooking food, the sound of a friend's voice, and countless other pieces of your world. A *response* is simply any action or behavior resulting from a stimulus—saying "Yum" when you smell rhubarb pie baking or turning your head to the sound of your friend's voice. Your next stimulus is Module 4. We hope you respond positively!

Now buckle up and enjoy the ride as we learn about the relationship between biology and psychology.

Biological Bases of Behavior

MODULES

4 The Nervous System and the Endocrine System

5 The Brain

Perhaps you're wondering why you're reading about the biological bases of behavior. After all, you signed up for a course in *psychology,* not *biology.* In the next two modules, we cover material that looks suspiciously as though it belongs in a biology textbook. What's going on?

Think of it this way. If your biological being suddenly disappeared, there would be nothing left. Without a body, there could be no behavior, and without a brain, there could be no mental processes. You couldn't play a sport or a musical instrument. You couldn't enjoy the taste of a ripe melon or a freshly baked chocolate chip cookie. You couldn't solve a problem or fantasize about the upcoming weekend. You could neither laugh at a joke (a behavior) nor understand the humor behind it (a mental process). You couldn't feel anxiety about an upcoming test or fall in love. In a nutshell, if biology disappeared, so would the stuff of psychology.

It's possible to study behavior and mental processes from a number of perspectives, including the cognitive perspective, the behavioral perspective, and the social-cultural perspective, and we do that in other sections of this book. But now it's biology's turn for the spotlight, and you may be surprised at the insight it provides.

MODULE 4

The Nervous System and the Endocrine System

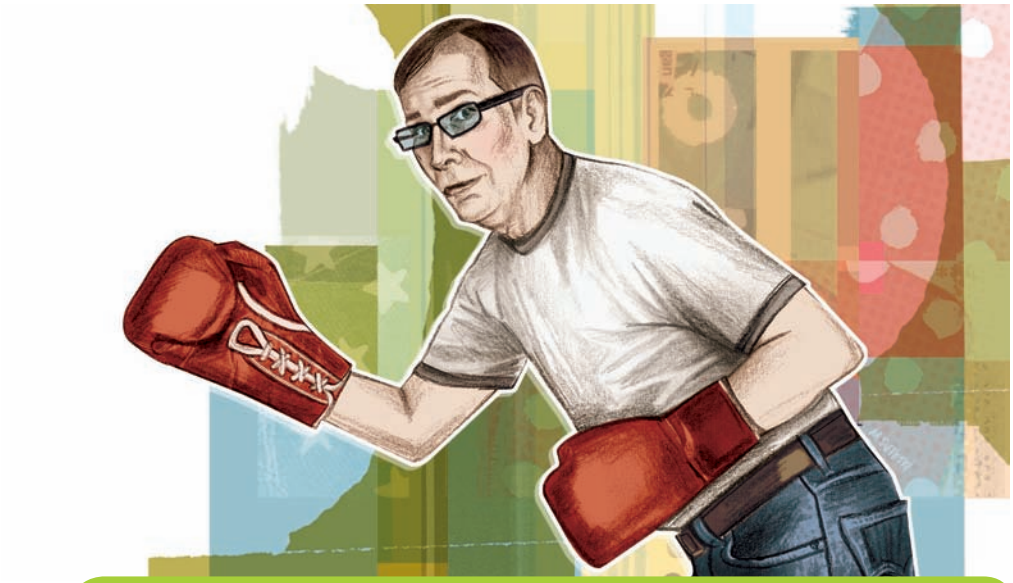
Neurons: The Building Blocks of the Nervous System

How Neurons Communicate

- The Neural Impulse
- Communication Between Neurons
- The Neural Chain

The Structure of the Nervous System

The Endocrine System



Have you ever heard of the fight-or-flight response? In a threatening situation, your body instantly prepares you to either fight off the threat or flee to safety. This response is produced by the nervous system and the endocrine system, our topics in this module.

Your body is an incredible organization of biological systems, each with its own important functions. Your skeletal system supports your body. Your digestive system extracts nutrients from food. Your immune system wards off disease. Your respiratory system allows you to take in oxygen and rid your cells of carbon dioxide. But the biological systems that psychologists focus on are the nervous system and the endocrine (hormonal) system. These two biological systems enable communication and information processing within our bodies.

neuron A nerve cell; the basic building block of the nervous system.

Neurons: The Building Blocks of the Nervous System

WHAT'S THE POINT?

4-1 What are the parts of a neuron, and what do they do?

The nervous system is your body's electrochemical communication system. Through it, your brain tells your body parts to move, your face to express emotion, and your internal organs to go about their business. Your nervous system, in partnership with your sensory systems, also gathers information so that your brain can respond appropriately to stubbed toes, fire alarms, and the smell of popcorn. Like every other system in your body, your nervous system is built of cells. Looking at those cells is a good starting point for understanding the whole system.

Your brain, spinal cord, and nerves are formed from **neurons,** the highly specialized and unique nerve cells of the nervous system. A neuron exists only to perform three tasks:

1. To receive information (in the form of electrochemical impulses) from the other neurons that feed into it
2. To carry this information down its length
3. To pass the information on to the next neurons in line

Every behavior, thought, and emotion you've ever experienced depends on the neuron's remarkable ability to process information in these three ways.

The Computer and the Brain

Both have amazing capabilities and get their power from millions of "switches" (electronic bits in the computer, neurons in the brain) that can be either on or off.

© MEDIAPHOTOS/ISTOCKPHOTO

The wonder of it all is that neurons are actually quite limited in function—their main capability is simply transmitting an impulse, or "firing." In some ways, the guts of powerful modern computers operate similarly. A computer's central processor controls many digital switches that can be either "on" or "off." All of a computer's extraordinary capabilities—its communication functions, elaborate games, number crunching, mind-dazzling graphics, and sound—are ultimately accomplished by setting switches in the proper on-or-off pattern.

Neurons work in a similar way: They can either fire (that is, send an impulse down their length) or not. That's it. The beautiful colors you see in a sunset, the intense emotions you experience during your first crush, the memory of your first day of kindergarten, the taste of pepperoni pizza, the thrill you feel when riding a roller coaster, and the devastating depression someone

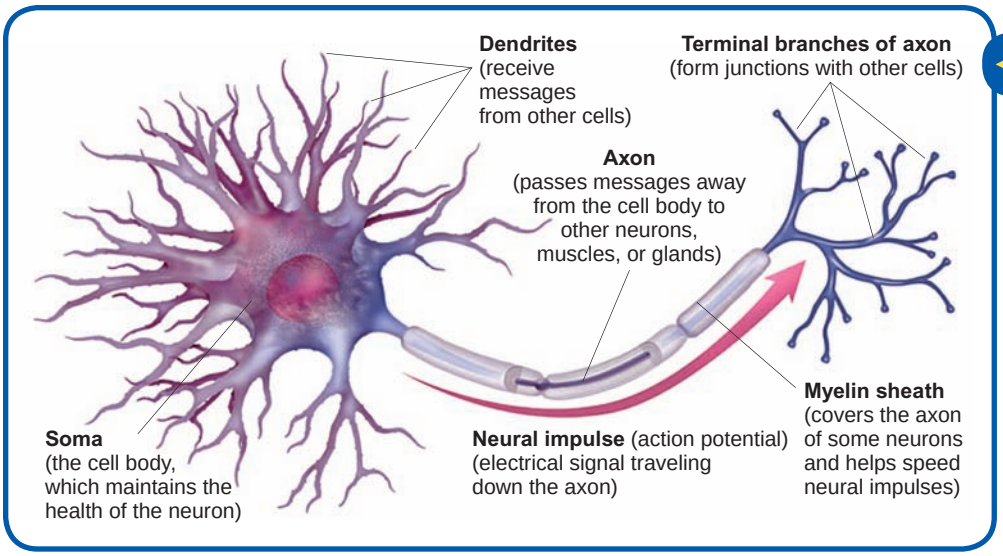

Dendrites
(receive messages from other cells)
Terminal branches of axon
(form junctions with other cells)
Axon
(passes messages away from the cell body to other neurons, muscles, or glands)
Soma
(the cell body, which maintains the health of the neuron)
Neural impulse (action potential)
(electrical signal traveling down the axon)
Myelin sheath
(covers the axon of some neurons and helps speed neural impulses)

Figure 4.1
A Typical Motor Neuron

Information travels from left to right in this neuron. Messages are received at the dendrites, travel through the soma and down the axon, and arrive at the axon terminals.

you know may suffer from—all emerge from a certain sequence of neurons either firing or not firing.

Neurons, like trees and dogs, come in a tremendous variety of shapes and sizes, but all neurons have similar structures. Take a minute now to look at **Figure 4.1,** which shows these structures in a *motor neuron,* a nerve cell that carries messages to muscles and glands. In this discussion, we examine the neuron's parts by following the order in which information travels—from the dendrites to the soma, the axon, and the axon terminals.

Dendrites are the branching extensions of a neuron that receive information and conduct impulses toward the cell body. Dendrites look like branches, and in fact the word *dendrite* comes from the Greek word for "tree." From the dendrites, the information moves to the soma, the cell body of a neuron. The soma contains the cell nucleus and other parts that keep the cell healthy and functioning properly. From there, information travels along the **axon,** the extension of a neuron through which neural impulses are sent. The neuron's purpose is to move information from point A to point B, and the axon creates distance between these points. Axons of neurons in the brain may be very short because information doesn't have to travel far between the cells. But in some neurons in the leg, axons extend more than 3 feet, making these giant redwoods of the nervous system the longest cells in your body! Longer axons are covered by a *myelin sheath* that protects the axon and speeds up the transmission of information. Finally, the information reaches the **axon terminals,** the end point of a neuron where neurotransmitters (discussed soon) are stored. As you will see, axon terminals are the points of departure for information as it makes its way to the dendrites of the next neurons in the sequence.

dendrite The branching extensions of a neuron that receive information and conduct impulses toward the cell body (soma).

axon The extension of a neuron through which neural impulses are sent.

axon terminal The end point of a neuron where neurotransmitters are stored.

PAUSE NOW OR MOVE ON

Turn to page 74 to review and apply what you've learned.

action potential A neural impulse; a brief electrical charge that travels down the axon of a neuron.

resting potential The state of a neuron when it is at rest and capable of generating an action potential.

How Neurons Communicate

Now we're ready to look more closely at what happens when a neuron fires. This involves changes both within a neuron and between neurons.

The Neural Impulse

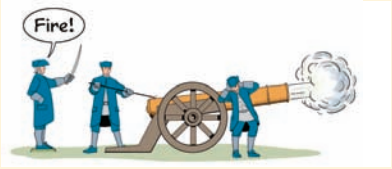
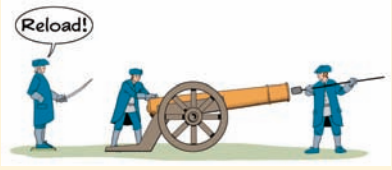
WHAT'S THE POINT?

4-2 How does a neuron fire?

When a neuron fires, it creates a neural impulse called an **action potential.** This brief electrical charge works its way from the dendrites to the axon terminals, much as a bite of swallowed food makes its way from your mouth to your stomach. This action potential represents the "on" condition of the neuron. Each action potential is followed by a brief recharging phase known as the refractory period, when a neuron, after firing, cannot generate another action potential. After the refractory period, the neuron is capable of another action potential when it is stimulated. When the cell is recharged, at rest, and capable of generating another action potential, a **resting potential** exists. Table 4.1 illustrates these steps.

Table 4.1

Three Phases of Communication Within a Neuron

Action potential		The neural impulse created when a neuron "fires." The impulse travels from the dendrites down the axon to the axon terminals.
Refractory period		The brief instant when a new action potential cannot be generated because the neuron is "recharging" after the previous action potential.
Resting potential		The state of a neuron when it is "charged" but waiting for the next action potential to be generated.

An interesting fact about how a neuron fires is called the **all-or-none principle,** which takes its name from the fact that a neuron always fires with the same intensity. All action potentials are the same strength. It doesn't matter if there is strong stimulation or weak stimulation at the cell's dendrites. As long as there is enough energy to trigger the neuron, it will fire with the same intensity.

One of the best analogies to a neuron and how it fires is, perhaps unfortunately, a toilet. Stop for a moment and think of how a toilet is similar to a neuron. Here are some similarities (perhaps you will be able to think of more):

- Like a neuron, a toilet has an action potential. When you flush, an "impulse" is sent down the sewer pipe.
- Like a neuron, a toilet has a refractory period. There is a short delay after flushing when the toilet cannot be flushed again because the tank is being refilled.
- Like a neuron, a toilet has a resting potential. The toilet is "charged" when there is water in the tank and it is capable of being flushed again.
- Like a neuron, a toilet operates on the all-or-none principle—it always flushes with the same intensity, no matter how much force you apply to the handle (as long as you provide enough force to trigger the mechanism).

all-or-none principle The principle stating that if a neuron fires, then it always fires at the same intensity; all action potentials have the same strength.

synapse [SIN-aps] The tiny, fluid-filled gap between the axon terminal of one neuron and the dendrite of another.

neurotransmitter A chemical messenger that travels across the synapse from one neuron to the next and influences whether a neuron will generate an action potential.

PAUSE NOW OR MOVE ON

Turn to page 75 to review and apply what you've learned.

Communication Between Neurons

WHAT'S THE POINT?

4-3 What is the role of neurotransmitters in communication between neurons?

So far, we have been discussing how information passes down the length of a single neuron. But how do messages travel from one neuron to the next? Amazingly, this happens without any two neurons actually coming in contact with each other! At every place where an axon terminal of one neuron and the dendrite of an adjacent neuron meet (and there may be thousands of such places on any single neuron), there is a tiny, fluid-filled gap called a **synapse** that action potentials cannot jump. In this gap, chemical messengers known as **neurotransmitters** travel across the synapse to carry the information from one neuron to the next. It is the neurotransmitter that influences whether the next neuron will generate an action potential (by firing) or not. When an action potential works its way to the end of a neuron, it causes the release of neurotransmitters from the axon terminals. The neurotransmitter molecules, which have a distinctive chemical shape, rapidly cross the synapse and fit into receptor sites on the dendrite of the next neuron (see **Figure 4.2**).

The neurotransmitters can come to rest only in receptor sites designed to fit their shape, just as a key can open only certain locks. Once in the receptor

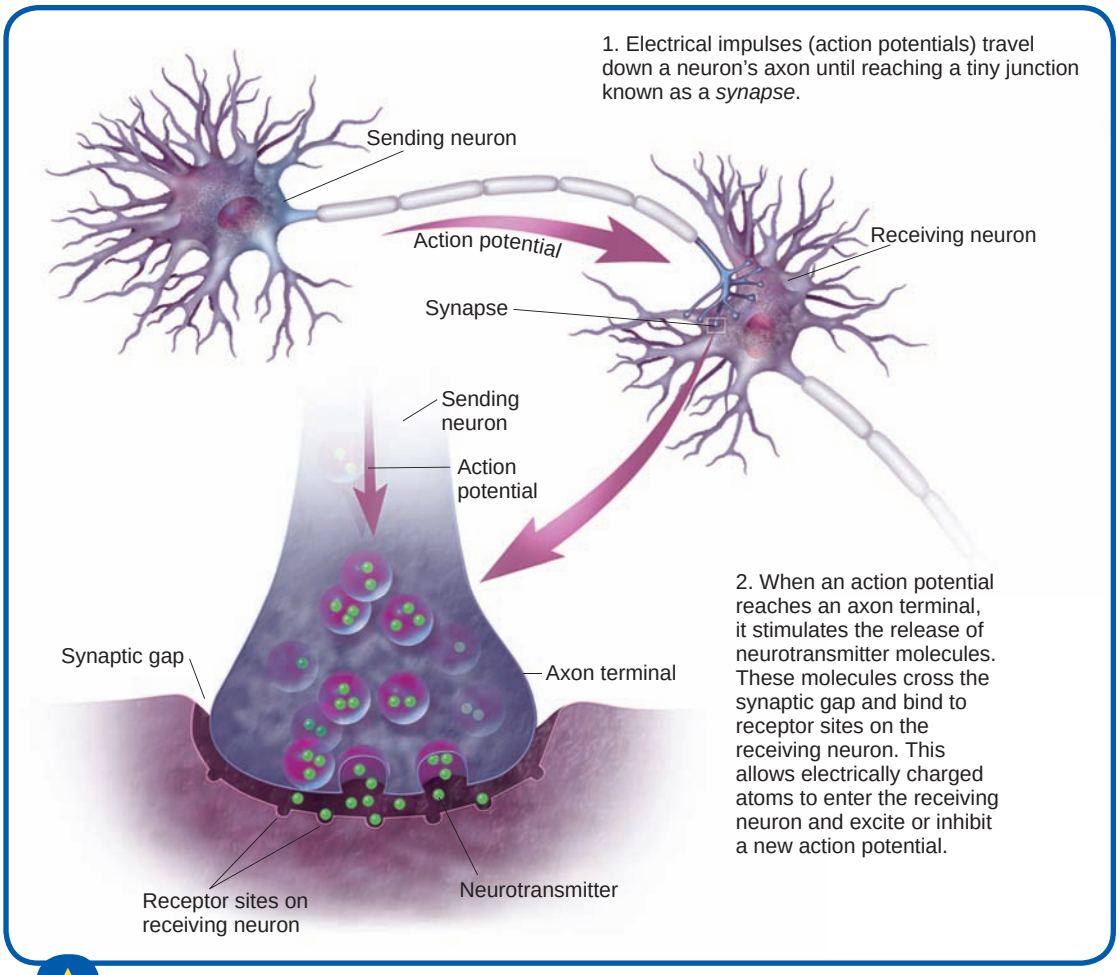

1. Electrical impulses (action potentials) travel down a neuron's axon until reaching a tiny junction known as a *synapse*.
Sending neuron
Action potential
Receiving neuron
Synapse
Sending neuron
Action potential
2. When an action potential reaches an axon terminal, it stimulates the release of neurotransmitter molecules. These molecules cross the synaptic gap and bind to receptor sites on the receiving neuron. This allows electrically charged atoms to enter the receiving neuron and excite or inhibit a new action potential.
Synaptic gap
Axon terminal
Receptor sites on receiving neuron
Neurotransmitter

Figure 4.2
Communication Between Neurons

The action potential triggers the release of a neurotransmitter from the axon terminals of the sending neuron. The neurotransmitter crosses the synapse and locks into receptor sites located on the dendrites of the receiving neuron.

site, neurotransmitters can serve two broad functions. Under some circumstances, neurotransmitters have an **excitatory effect,** which makes it more likely that the receiving neuron will generate an action potential, or fire. Other times, neurotransmitters have an **inhibitory effect,** which makes it less likely that the receiving neuron will generate an action potential. The excitatory role is like a green light. It shouts, "Just do it!" The inhibitory role is like a red light. Its message is "Just say no!"

There are dozens of neurotransmitters, although so far researchers have not learned the specific functions of all of them. Different neurotransmitters serve different functions, depending not only on the type of receptor site each locks into but also on the place where they are released in the brain (see Thinking Like a Psychological Scientist: Neurotransmitters and Drugs).

The Neural Chain

The neural chain describes the path information follows as it is processed by the nervous system. To understand it, consider the example of playing your favorite radio station on your sound system. What is necessary for this task? First, the radio station must broadcast the music over radio waves. Second, your system's antenna has to pick up the radio waves and send them as an

electronic message along a wire to the radio receiver. The receiver must process this information by tuning to the proper frequency and then filtering and amplifying it. Then the electronic information is sent to the speakers, again along a wire. Finally, the speakers vibrate to create the sound of a new song. The stereo goes through this process of receiving, processing, and outputting information continuously.

Your nervous system also specializes in receiving and processing information, and it contains functional components similar to those that make up your sound system. First, you need to gather information from your environment. Your "antennae" are **receptor cells,** specialized cells in the sensory systems of the body. These amazing receptor cells can turn other kinds of energy into action potentials (impulses) your brain can understand. Your eyes, for example, have receptor cells that take light energy and turn it into nerve impulses. Your ears have receptor cells that process sound energy, and elsewhere in your body there are other receptor cells that process smells, tastes, and touch into nerve impulses. Without these receptor cells, your brain would be helpless. By itself, your brain cannot detect light, sound, or smell. Just as you need your sound system to turn radio waves into something meaningful (music), your brain needs your senses and their receptor cells to gather and transform information into a form your brain can understand.

The sense organs are not actually located in the brain, so your nervous system must literally move the information your receptor cells pull in. This movement occurs as billions of neurotransmitter molecules pass messages among millions of these kinds of neurons—from your fingertips, your eyeballs, your ears, your nose, and your mouth to the proper area of the brain for processing. Just as a sound system uses metal wires to move information, your body uses living wires known as nerves, which are bundles of individual neurons. **Sensory nerves** carry information from the sense receptors to the brain and spinal cord. Without sensory nerves, your brain would be no more effective than your radio receiver would be if somebody cut the wire bringing information from the antenna.

The brain, like a radio receiver, is the real powerhouse of the system. The brain must process a constant barrage of sensory data flowing in from the sensory nerves. Your brain receives information about what you see, hear, taste, smell, and feel throughout your body (although most of it is ignored as probably insignificant). It is the brain's responsibility to deal with all of the information and make appropriate decisions, just as your sound system properly filters and amplifies an incoming radio signal. The billions of neurons in your brain and spinal cord that process information are called **interneurons.**

Your brain determines when action is necessary to deal with incoming information. If your brain detects a ball moving toward your head, you need to either catch the ball or duck to avoid being hit. If your brain detects a question asked by your teacher, you need to decide on an appropriate answer and say it. If your brain detects that you're overheating, you need to begin sweating. The point is that while the brain can *determine* a course of action on its own (such as speaking or sweating), it cannot actually *do* these things. To trigger actions the brain must get word to the body's muscles and glands, just as your sound system must convey the processed signal from the receiver to its speakers. Your sound system uses more wires for this purpose. Similarly, your nervous system uses *motor nerves* to carry information

excitatory effect A neurotransmitter effect that makes it more likely that the receiving neuron will generate an action potential, or "fire."

inhibitory effect A neurotransmitter effect that makes it less likely that a receiving neuron will generate an action potential, or "fire."

receptor cells Specialized cells in every sensory system of the body that can turn other kinds of energy into action potentials (neural impulses) that the brain can process.

sensory nerves Nerves that carry information from the sense receptors to the spinal cord and brain.

interneurons Nerve cells in the brain and spinal cord responsible for processing information.

Thinking Like a PSYCHOLOGICAL SCIENTIST

Neurotransmitters and Drugs

The synapse is where it's at when it comes to the effects of many drugs. Let's take a look at the roles of three key neurotransmitters (see **Table 4.2**) and see what happens when outside chemicals are added to the mix.

One neurotransmitter, *acetylcholine (ACh),* triggers muscle contraction and affects both learning and memory (Alzheimer's disease is associated with low levels of ACh). ACh is present in every synapse of motor nerves. Certain drugs can disrupt the normal effects of ACh, however. Some South American Indians use such a drug, a poison called curare, to coat the tips of the darts they use in their blowguns. When these darts strike an animal, the result is paralysis. Why? Because the curare molecules fill the receptor sites on dendrites that normally receive ACh, but the curare molecules do not stimulate an action potential in the receiving neuron the way ACh would. This means that ACh is blocked from doing its job, and movement ceases. Substances such as curare that block the effects of a neurotransmitter are called **antagonists.**

Black widow spider venom also interacts with ACh, but not in the same way curare does. The venom fills the ACh receptor sites, but its chemical structure is so similar to ACh that it mimics ACh's effect on the receiving neuron. So, now two substances, ACh and spider venom, are doing the same thing. The result is excessive and uncontrollable movement in the form of convulsions. The spider venom is called an **agonist,** a drug that boosts the effect of a neurotransmitter. **Figure 4.3** illustrates how antagonists and agonists interact with neurotransmitters.

Another neurotransmitter with interesting effects is *dopamine,* which influences learning, attention, and emotion. Schizophrenia, a serious illness that disrupts a person's sense of reality, is associated with high levels of dopamine. Drugs commonly prescribed for schizophrenia alleviate some of the symptoms by blocking the action of dopamine at the synapse. These drugs are dopamine antagonists.

Another disorder, depression, may be associated with low levels of the neurotransmitter *serotonin,* which affects hunger, sleep, arousal, and mood. Some medications, the most famous of which is Prozac, work to reduce depression by enhancing the availability of

Table 4.2

Examples of Neurotransmitter Functions

Neurotransmitter	Affected Functions	Associated Problems
Acetylcholine (ACh)	• Muscle action • Learning • Memory	ACh-producing neurons have deteriorated in people with Alzheimer's disease.
Dopamine	• Learning • Attention • Emotion	Excess dopamine activity is associated with schizophrenia.
Serotonin	• Hunger • Sleep • Arousal • Mood	Low levels of serotonin may be associated with depression.

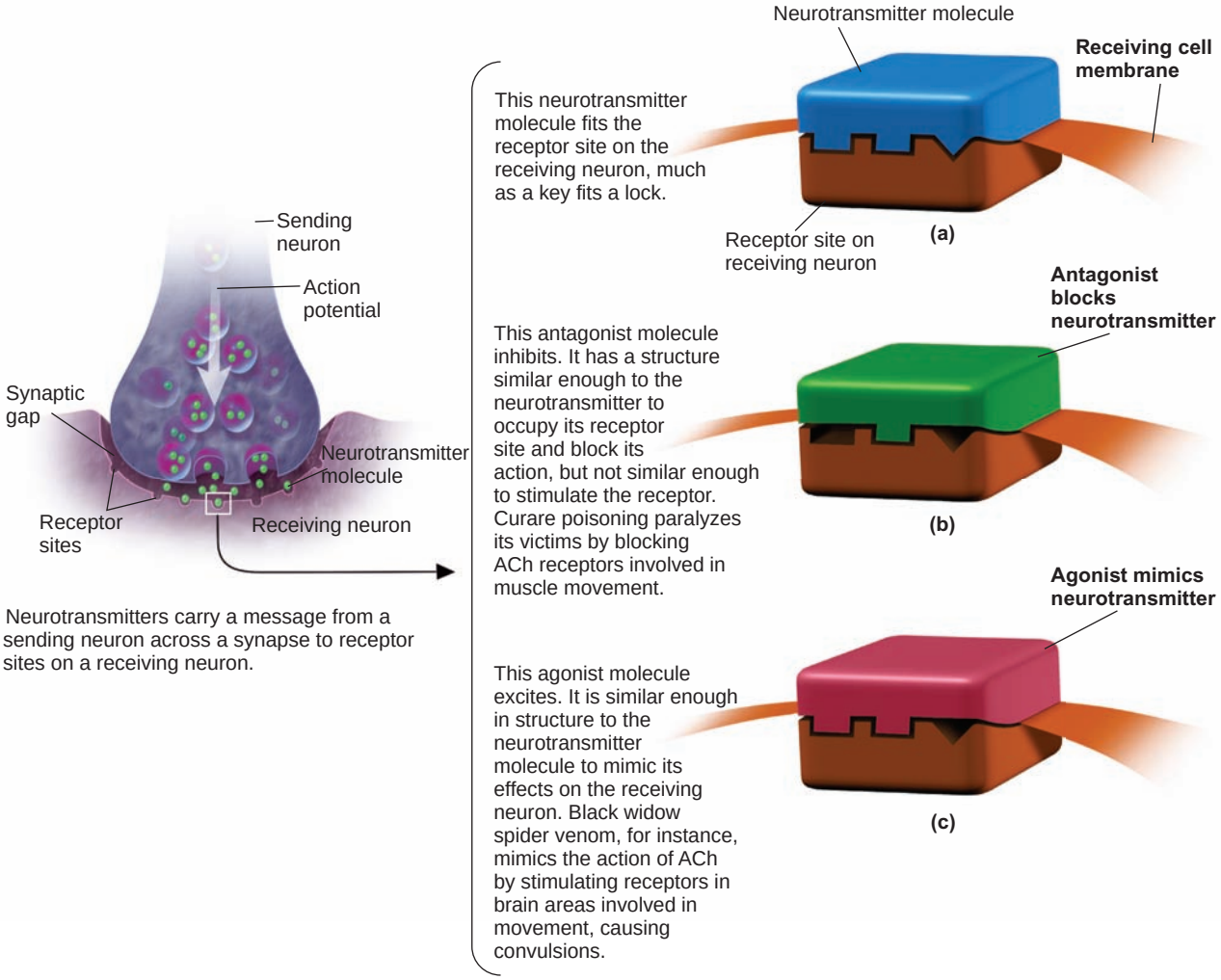

Sending neuron
Action potential
Synaptic gap
Neurotransmitter molecule
Receptor sites
Receiving neuron
Neurotransmitters carry a message from a sending neuron across a synapse to receptor sites on a receiving neuron.
Neurotransmitter molecule
Receiving cell membrane
This neurotransmitter molecule fits the receptor site on the receiving neuron, much as a key fits a lock.
Receptor site on receiving neuron
(a)
Antagonist blocks neurotransmitter
This antagonist molecule inhibits. It has a structure similar enough to the neurotransmitter to occupy its receptor site and block its action, but not similar enough to stimulate the receptor. Curare poisoning paralyzes its victims by blocking ACh receptors involved in muscle movement.
(b)
Agonist mimics neurotransmitter
This agonist molecule excites. It is similar enough in structure to the neurotransmitter molecule to mimic its effects on the receiving neuron. Black widow spider venom, for instance, mimics the action of ACh by stimulating receptors in brain areas involved in movement, causing convulsions.
(c)

Figure 4.3
Antagonists and Agonists

When a drug *blocks* the effect of a neurotransmitter, it's called an antagonist. When a drug *boosts* the effect of a neurotransmitter, it's called an agonist.

serotonin at the synapse. Prozac, therefore, is a serotonin agonist.

Prescribed medications are not the only substances that exert their effects at the synapse. All mind-altering chemicals, ranging from caffeine to cocaine, operate by influencing neurotransmission. A single drug, such as alcohol, might influence several neurotransmitters in different ways depending on the synapse it enters. Research on neurotransmitters is always in progress and brings fascinating and important results.

antagonist A drug that blocks the effect of a neurotransmitter.

agonist A drug that boosts the effect of a neurotransmitter.

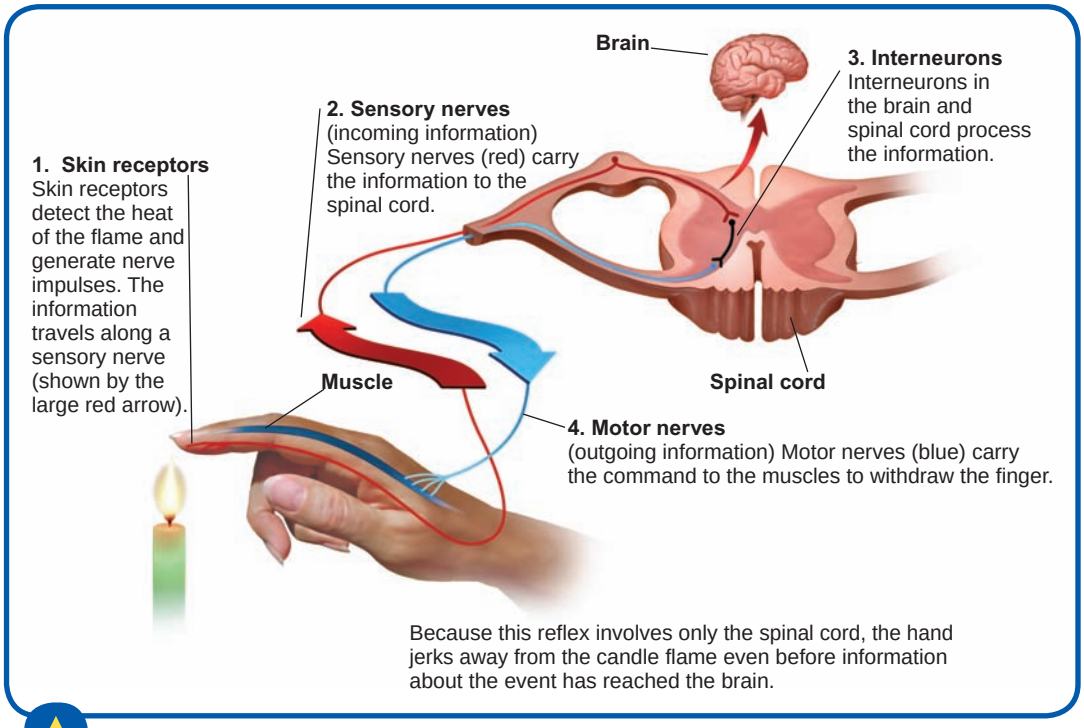

Brain
3. Interneurons
Interneurons in the brain and spinal cord process the information.
2. Sensory nerves
(incoming information)
Sensory nerves (red) carry the information to the spinal cord.
1. Skin receptors
Skin receptors detect the heat of the flame and generate nerve impulses. The information travels along a sensory nerve (shown by the large red arrow).
Muscle
Spinal cord
4. Motor nerves
(outgoing information) Motor nerves (blue) carry the command to the muscles to withdraw the finger.
Because this reflex involves only the spinal cord, the hand jerks away from the candle flame even before information about the event has reached the brain.

Figure 4.4
A Neural Chain

When you burn your finger, a neural chain is activated. Receptor cells, sensory nerves, interneurons, motor nerves, and muscles all work together to minimize the damage from the flame.

away from your brain and spinal cord to your muscles and glands so that they can take action. Without motor nerves, your brain could not accomplish anything. (Your sound system wouldn't be much good without speakers, would it?)

Figure 4.4 shows a neural chain so basic that the initial action is determined by the spinal cord without the involvement of the brain. In this case, the response to the heat from the flame is a *simple reflex*. To react quickly to a dangerous situation, an interneuron in the spinal cord sends the command to withdraw the finger even before other interneurons relay the information to your brain.

PAUSE NOW OR MOVE ON

Turn to page 75 to review and apply what you've learned.

The Structure of the Nervous System

WHAT'S THE POINT?

4-4 What are the divisions of the nervous system, and what do they do?

So far, we've examined the nervous system by zooming in on its smaller pieces—sensory and motor nerves made up of bundles of neurons that send their neurotransmitters to one another. Now it's time to take a step back for a broader view of the whole nervous system in which these smaller pieces function.

One good way to understand the nervous system is to study its major divisions, which you can see in **Figure 4.5.** The nervous system has two major components: the central nervous system and the peripheral nervous system.

The **central nervous system (CNS)** includes the brain and the spinal cord, both of which are so important that they are encased in bone for protection. The brain is where most information processing takes place, and the spinal cord is the main pathway information follows as it enters and leaves the brain. In shape, the spinal cord tapers from about the thickness of a broomstick where it joins the brain to the diameter of a pencil lead at the base of the back. The interneurons that make up the CNS are responsible for processing information.

The **peripheral nervous system (PNS)** contains all sensory nerves and motor nerves that connect the brain and the spinal cord to the rest of the body. The word *peripheral* means "outer region" (perhaps you've heard of peripheral vision, which refers to your ability to see things on the outer regions of your visual field). The PNS divides into two subsystems—the somatic nervous system and the autonomic nervous system:

- The **somatic nervous system** is the division of the peripheral nervous system that controls the body's skeletal muscles. It contains the motor nerves you use to activate muscles voluntarily. You develop the idea to walk across a room using your central nervous system, but you rely on your somatic nervous system to carry the CNS's commands to the muscles of your legs and to get feedback about what your legs are actually doing.
- The **autonomic nervous system** is the division of the peripheral nervous system that controls the glands and muscles of the internal organs. It monitors the automatic functions of your body. Your autonomic nervous system controls your breathing, blood pressure, and digestive processes.

central nervous system (CNS) The brain and the spinal cord.

peripheral nervous system (PNS) The sensory and motor nerves that connect the brain and the spinal cord to the rest of the body.

somatic nervous system The division of the peripheral nervous system that controls the body's skeletal muscles.

autonomic [aw-tuh-NAHM-ik] nervous system The division of the peripheral nervous system that controls the glands and muscles of the internal organs; its subdivisions are the sympathetic (arousing) division and the parasympathetic (calming) division.

● Did you notice that this is the second time in this module we have a word built from the Greek *soma*, which means "body"?

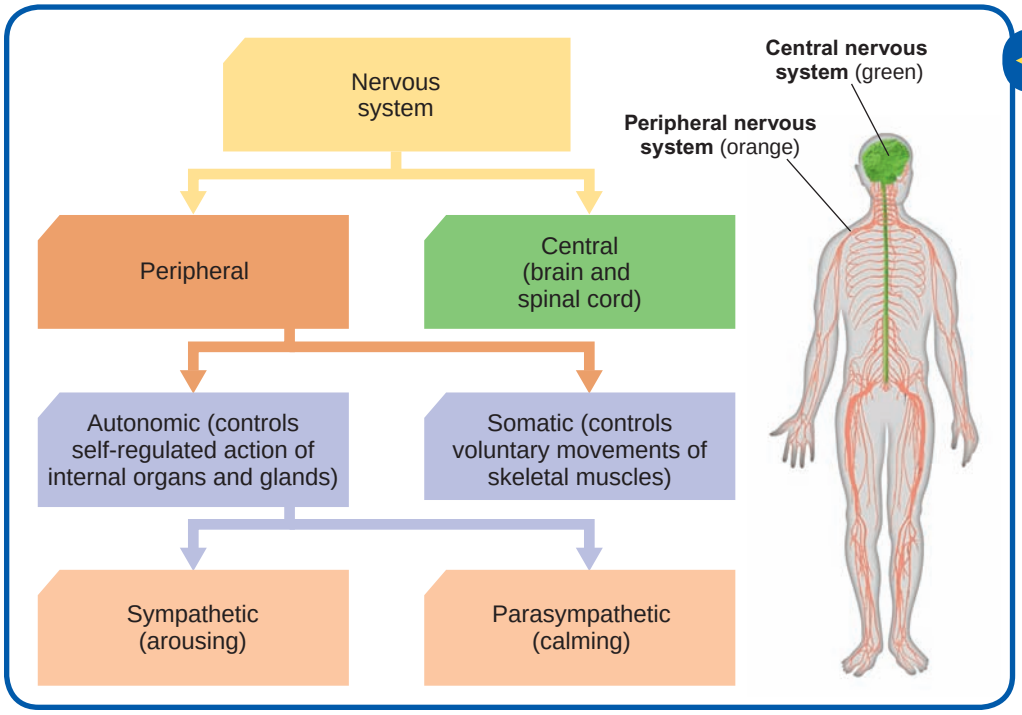

Nervous system
Peripheral
Central (brain and spinal cord)
Autonomic (controls self-regulated action of internal organs and glands)
Somatic (controls voluntary movements of skeletal muscles)
Sympathetic (arousing)
Parasympathetic (calming)
Central nervous system (green)
Peripheral nervous system (orange)

Figure 4.5
Divisions of the Nervous System
The nervous system is made up of several important divisions.

sympathetic division The part of the autonomic nervous system that arouses the body to deal with perceived threats.

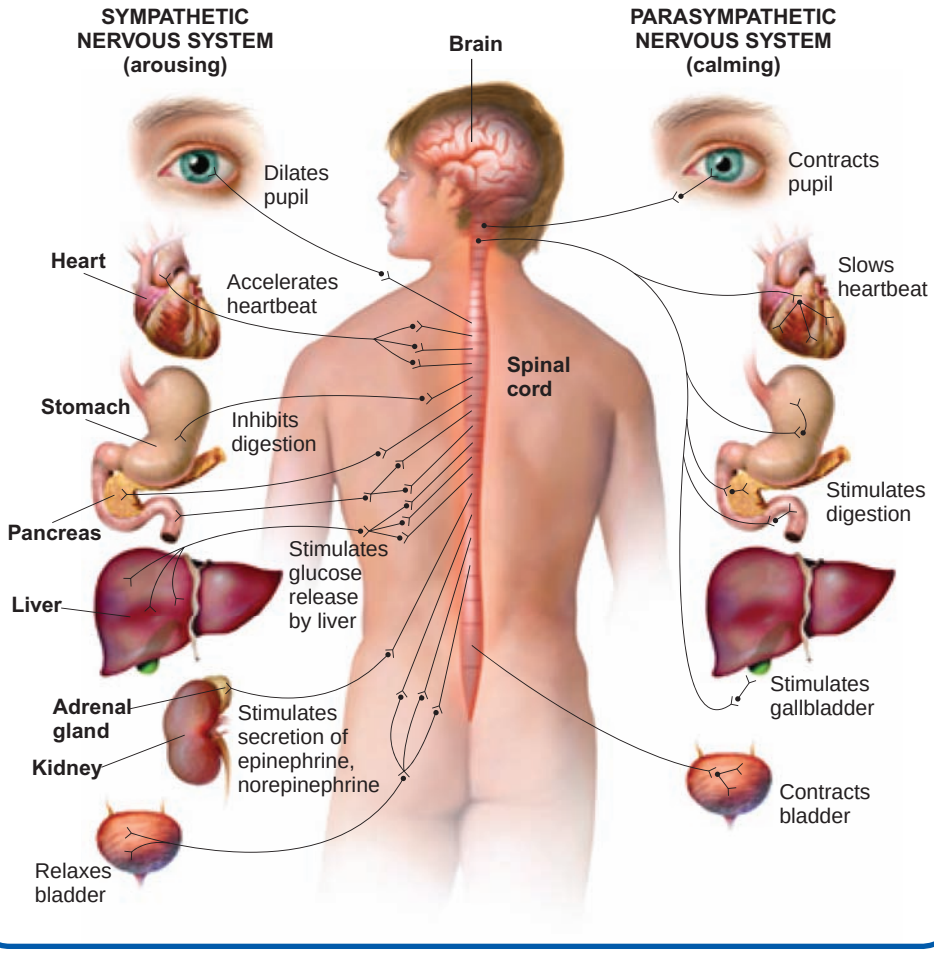
parasympathetic division The part of the autonomic nervous system that calms the body.

The autonomic nervous system has two subdivisions—a sympathetic division and a parasympathetic division (see **Figure 4.6**). These two divisions work together in a masterful example of checks and balances—it's not just our government that relies on this principle! The **sympathetic division** is the part of the autonomic nervous system that arouses the body to deal with perceived threats. It controls a number of responses collectively referred to as the *fight-or-flight response*. If you hear footsteps closing in behind you late at night on a deserted sidewalk, if a teacher announces a pop quiz at the beginning of class, or if you're about to make a nervous phone call to ask somebody out on a date, then your sympathetic nervous system will kick in.

The **parasympathetic division** is the part of the autonomic nervous system that calms the body. The sympathetic division may send your blood pressure higher when you are caught coming in after your curfew; your parasympathetic division brings your blood pressure back down to normal when your explanation of car trouble is fortunately accepted.

Figure 4.6
The Sympathetic and Parasympathetic Divisions of the Autonomic Nervous System

The sympathetic division arouses us and expends energy. The parasympathetic division calms us and conserves energy.



PAUSE NOW OR MOVE ON

Turn to page 75 to review and apply what you've learned.

The Endocrine System

endocrine [EN-duh-krin] system One of the body's two communication systems; a set of glands that produce hormones, chemical messengers that circulate in the blood.

hormone A chemical messenger produced by the endocrine glands and circulated in the blood.

pituitary gland The endocrine system's "master gland" that, in conjunction with an adjacent brain area, controls the other endocrine glands.

WHAT'S THE POINT?

4-5 How does the endocrine system communicate, and what does it do within the body?

Besides the nervous system, your body has another system for communicating information. This system, slower to awaken and slower to shut down than the nervous system, is the **endocrine system,** a set of glands that produce hormones. **Hormones** are chemical messengers that circulate throughout the body in the blood. Hormones and neurotransmitters are similar in function: Both carry messages, and both communicate by locking into receptor sites.

Figure 4.7 illustrates the major endocrine glands. The most important is the pituitary gland, the endocrine system's "master gland." The **pituitary gland,** in conjunction with an adjacent brain area, controls the other endocrine glands. The brain may call on the pituitary to release hormones that stimulate or inhibit the release of other hormones from other endocrine glands. The pea-sized pituitary is located at the base of the brain, and it connects to a part of the brain called the *hypothalamus*. At this connection, the tissue is part glandular and part neural, which illustrates the close relationship between the nervous and the endocrine systems.

The brain monitors the levels of hormones circulating in the blood and may be influenced by their levels. Hunger, for example, is a response to a complex interaction of the nervous system and the endocrine system. The hypothalamus and pituitary gland work together to monitor and control the levels of *glucose* (blood

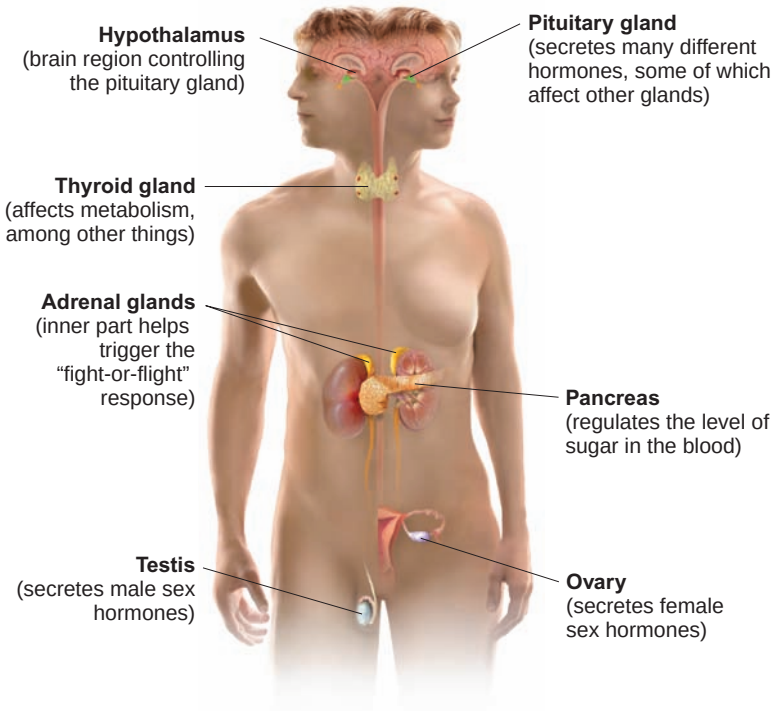


Figure 4.7
Major Glands of the Endocrine System

Endocrine glands secrete hormones into the bloodstream. The hormones can influence how we feel and behave.

sugar that your cells use for fuel) and *insulin* (a hormone the pancreas gland secretes, which allows the cells to use the available glucose). This, and a host of other factors, determines how hungry you are at any given moment. The important pituitary also releases hormones related to physical growth and pregnancy.

Other endocrine glands include the thyroid, the adrenals, and the sex glands (or gonads). The *thyroid gland,* located in the neck, helps regulate energy level. The *adrenal glands,* which perch atop the kidneys, release *epinephrine* and *norepinephrine* (also called *adrenaline* and *noradrenaline*). These substances enhance strength and endurance in emergency situations. The sex glands—*ovaries* in females and *testes* in males—release hormones that influence emotion and physical development. The primary male hormone is *testosterone* and the primary female hormone is *estrogen,* but both males and females have each hormone present in their systems.

PAUSE NOW OR MOVE ON

Turn to page 75 to review and apply what you've learned.

I'm seated at my desk right now, working on a computer that will process e-mail, connect to the Internet, and play music on iTunes with a click of the mouse. It does this through a cable modem, which is also the source of the TV programming I can access with the remote control that sits next to the cell phone I used to talk to my son, 90 miles away, a few minutes ago. Also on the desk is a stack of bills, delivered by the U.S. Postal Service. Later this afternoon I will pay them—electronically—by using the computer to send instructions to my credit union. I depend on these methods of communication to function effectively in the world, just as my body depends on the nervous system and the endocrine system for its communication needs. These systems are our personal information highways.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 4

Thinking About the Nervous System and the Endocrine System

Neurons: The Building Blocks of the Nervous System

WHAT'S THE POINT?

4-1 What are the parts of a neuron, and what do they do?

- Neurons are made of dendrites, which receive information and pass it along to the cell body (soma). The axon carries this information to the axon terminals, which release neurotransmitters into the synapse, carrying information to the next neuron.

Apply What You Know

1. What is the general function of neurons?
   a. Neurons receive, carry, and pass on information to other neurons.
   b. Neurons rebuild our chemical, electrical, and hormonal systems after stress.
   c. Neurons control conscious behaviors.
   d. Neurons produce hormones to carry messages to endocrine glands.
2. The axons of some neurons are coated with a _____ sheath.

How Neurons Communicate

The Neural Impulse

WHAT'S THE POINT?

4-2 How does a neuron fire?

- Within the cell, a small electrical charge (an action potential) travels down the axon.

Apply What You Know

3. True or False: The firing intensity of a neuron determines the intensity of the response.
4. The _____ period is the recharging phase, during which a neuron, after firing, cannot generate another action potential.

Communication Between Neurons

WHAT'S THE POINT?

4-3 What is the role of neurotransmitters in communication between neurons?

- The neurotransmitters released from axon terminals into the synapse can either excite the next neuron to fire or inhibit it from firing.

Apply What You Know

5. A drug that treats symptoms of depression and affects the sleep cycle probably interacts with
   a. dopamine.
   b. acetylcholine.
   c. serotonin.
   d. curare.
6. What does it mean to say that a neurotransmitter can excite or inhibit neural impulses?

The Structure of the Nervous System

WHAT'S THE POINT?

4-4 What are the divisions of the nervous system, and what do they do?

- The nervous system is divided into two main systems: the central nervous system (CNS) and the peripheral nervous system (PNS).
- The PNS is divided into the somatic (which controls skeletal muscles) and autonomic (which controls glands and internal organs) nervous systems.
- The autonomic nervous system is divided into the sympathetic division, which speeds the body up, and the parasympathetic division, which slows it down.

Apply What You Know

7. The fight-or-flight response is triggered by the _____ division of the peripheral nervous system.
8. The peripheral nervous system divides into the _____ nervous system and the _____ nervous system.

The Endocrine System

WHAT'S THE POINT?

4-5 How does the endocrine system communicate, and what does it do within the body?

- The endocrine system is a set of glands that communicate chemically using hormones.
- These glands use hormones to influence many functions within the body, including hunger, energy levels, strength, endurance, and physical development.

Apply What You Know

9. The body's two communications systems are the nervous system and the _____ system.

10. Which of the following glands is the "master gland"?

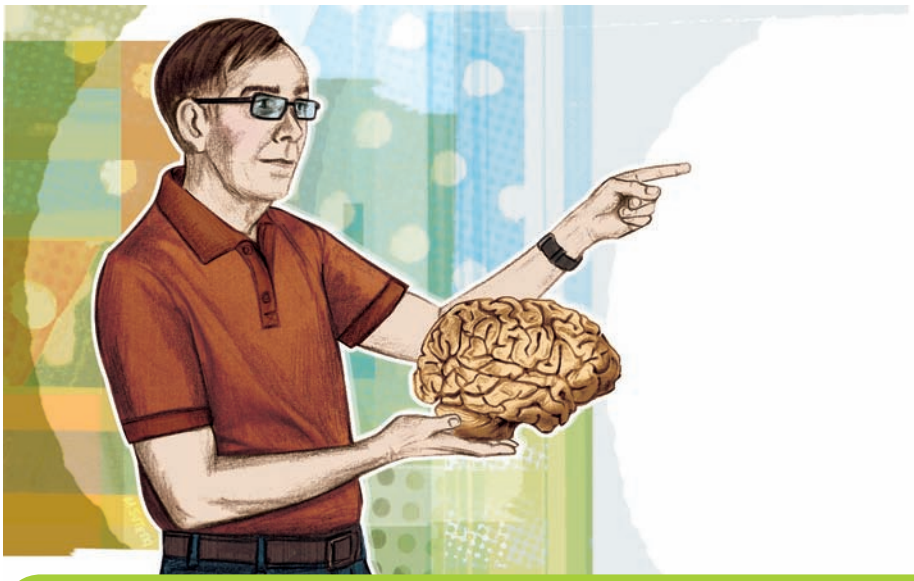
    a. the testes
    b. the pituitary
    c. the thyroid
    d. the adrenal

KEY TERMS

neuron, p. 62
dendrite, p. 63
axon, p. 63
axon terminal, p. 63
action potential, p. 64
resting potential, p. 64
all-or-none principle, p. 65
synapse [SIN-aps], p. 65
neurotransmitter, p. 65
excitatory effect, p. 66
inhibitory effect, p. 66
receptor cells, p. 67
sensory nerves, p. 67
interneurons, p. 67
antagonist, p. 68
agonist, p. 68
central nervous system (CNS), p. 71
peripheral nervous system (PNS), p. 71
somatic nervous system, p. 71
autonomic [aw-tuh-NAHM-ik] nervous system, p. 71
sympathetic division, p. 72
parasympathetic division, p. 72
endocrine [EN-duh-krin] system, p. 73
hormone, p. 73
pituitary gland, p. 73

MODULE 5

The Brain



The human brain is perhaps the most fascinating, complicated, and powerful structure in the universe.

Studying the Brain
- Case Studies
- Scanning Techniques

Lower-Level Brain Structures
- The Brainstem
- The Thalamus
- The Cerebellum
- The Limbic System

The Cerebral Cortex
- Major Divisions of the Cortex
- Movement and Feeling
- Plasticity

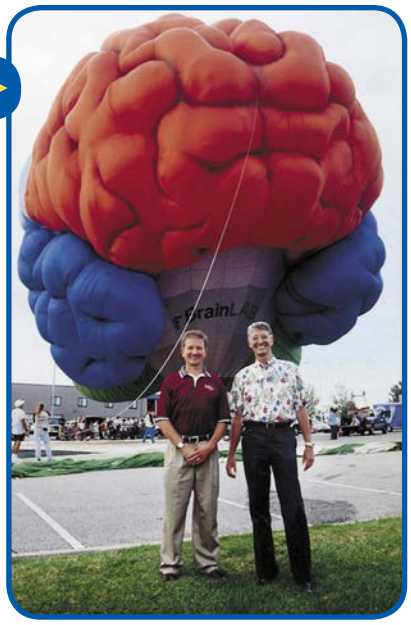
Differences Between the Brain's Two Hemispheres
- Language and Spatial Abilities
- The Split Brain

What is the most amazing thing in the universe? The answer is a matter of opinion, no doubt, but surely one of the leading candidates must be the brain. Think about it—oops, I guess that's already impossible without your brain! All art, music, and literature ever created began in a brain. The world's great (and not-so-great) architecture started in a brain. The principles of democracy, mathematics, and science began in a brain. You name it: If humans (or other animals) were behind it, the brain is what allowed it to happen. A brain can even think of itself in an effort to understand itself. Your liver can't do that.

The brain's complexity is, well, mind-boggling, but our discussion is limited to the basics. Vocabulary is the key. If you can master the words (most of which would already make perfect sense if you spoke Greek and Latin!), you will be well on your way to understanding your brain.

A Universe of Brains

One indication of our endless fascination with brains is the number of objects that use the shape of a human brain to attract attention. My students have brought me several dozen toys, advertisements, and cards that use the human brain. When do you suppose they'll bring me a hot air balloon?

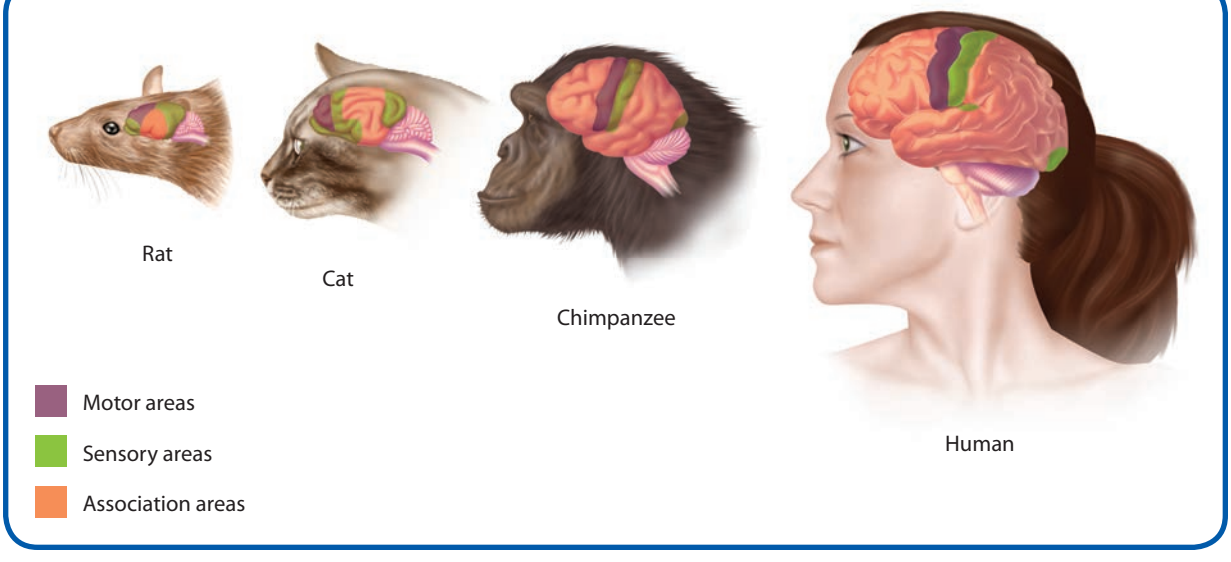


COLUMBIA DAILY TRIBUNE, PHOTO COURTESY OF BERNIE ESSER/AP IMAGES

The brains of most animals and all mammals share certain similarities (see **Figure 5.1**). Most animal brains, for example, have similar components because they share certain functions, such as digestion and respiration. The more complex the organism, the more complex and highly developed its brain. Complex organisms share basic components with less complex life forms. These parts of the brain developed first and tend to be in the inside, lower regions of the brain. The more complex parts of the brain that control uniquely human functions—things like judgment and sense of humor—are layered around and on top of the lower, more basic regions of the brain. In isolation, no one part of the brain would be capable of anything, but functioning together, the parts of the brain form an integrated whole with remarkable abilities. We will begin our discussion with the lower structures of the brain and then progress to those complex structures that truly make humans special. But first, let's take a look at how psychological scientists study the brain.

Figure 5.1
Brain Similarities in Different Mammals

Every mammal has a brain that can engage in similar functions, such as the ones noted here. The core areas of mammal brains are even more similar than the outer surfaces depicted here.



Studying the Brain

case study A research technique in which one person is studied in depth in the hope of revealing universal principles.

WHAT'S THE POINT?

5-1 What tools are available to psychological scientists for studying the brain?

Case Studies

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In a **case study,** one person is studied in depth in the hope of revealing useful information. One of the most famous case studies in the history of psychology is that of Phineas Gage. Gage, a young man in his twenties, was working for the railroad in 1848 when he suffered a devastating brain injury. An explosion blew a pointed, 4-foot-long rod through Gage's cheek, just behind his eye, and straight out through the top of his skull (see **Figure 5.2**). Despite severe damage to his frontal lobe, Gage survived. In fact, he never even lost consciousness! The disruptive changes in his personality, however, have fascinated people ever since. Because the injury damaged the frontal lobe, where the judgment and the ability to make good decisions are located, Gage went from being a responsible worker to becoming an unreliable, irritable, dishonest man who could not hold his previous job. Despite living many more years, he was, in the words of a friend, "no longer Gage." Gage's injury and the annals of many other brain injuries over the years have allowed psychologists to speculate on the functions of the parts of the brain destroyed by the accidents. Each unfortunate injury allows psychologists to add another piece to the puzzle of how the brain operates.

Case studies have always been an important way to study the brain, but they are limited in the kind of information they provide because accidents are haphazard. And because case studies are based on a sample size of one, it is difficult to generalize the findings to other cases. How do we know everyone would respond as Gage did to similar circumstances? Only experiments

Figure 5.2
Phineas Gage

This case study is so compelling that it's still being researched more than 150 years after Gage's accident. On the left is a computer-generated image showing the probable path of the rod that passed through Gage's brain. On the right is a photograph taken after the accident. Gage is holding the rod.

computerized axial tomography (CT or CAT) A series of X-ray photographs taken from different angles and combined by computer into a composite representation of a slice through the body.

magnetic resonance imaging (MRI) A technique that uses magnetic fields and radio waves to produce computer-generated images that distinguish among types of soft tissue; this allows us to see structures within the brain.

allow us to draw solid cause-and-effect conclusions. From a scientific point of view, our conclusions would be more sound if we could systematically damage specific brain regions in experiments on humans. You are probably already considering the ethical difficulties with this—at the least, it would be difficult to secure volunteers! So, given the ethical limits to gathering experimental evidence on the brain, case studies can provide important but somewhat limited information. Luckily, ever-improving technology gives us another line of evidence.

Scanning Techniques

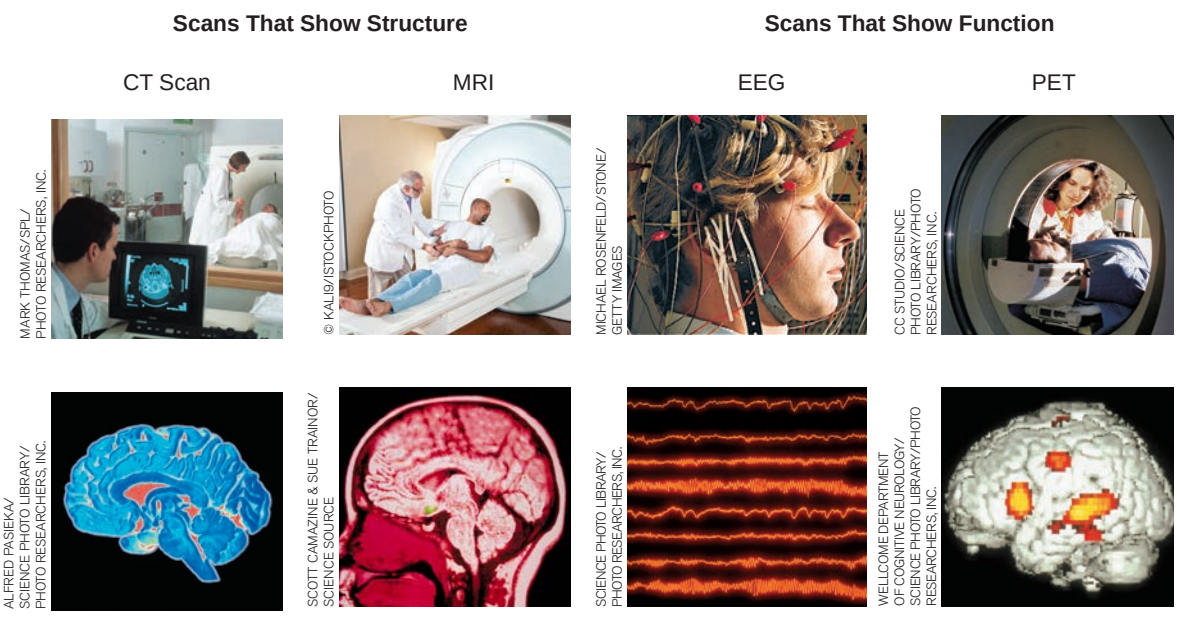
With remarkable technological advances, various scanning techniques provide a window through which researchers can study healthy, functioning brains in living people. These techniques have revolutionized brain research and the diagnosis and treatment of brain problems. Brain scans provide information in two different categories: brain structure and brain function (see **Figure 5.3**).

To study brain *structure,* researchers mostly use two kinds of scans: computerized axial tomography and magnetic resonance imaging. **Computerized axial tomography** (usually referred to as **CT or CAT**) is a series of X-rays taken from different angles and combined by computer into a composite representation of a slice through the body. **Magnetic resonance imaging (MRI)** uses magnetic fields and radio waves to produce computer-generated images that distinguish among different types of soft tissue. This allows us to see different structures within the brain. These scans are ideal for examining what the specific parts of the brain (and other parts of the body as well) actually look like. For example, CT scans and MRI images can find a tumor or locate brain damage following a stroke.

To study brain *function,* researchers mostly use the electroencephalogram, the positron emission tomograp hy scan, and a newer technology based on

Figure 5.3
Modern Scanning Techniques

These machines may look scary, but they provide a window into the brain for both research and treatment of disorders.


Scans That Show Structure
Scans That Show Function
CT Scan
MRI
EEG
PET
What Scanners Look Like
What Brain Scans Look Like
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magnetic resonance imaging called functional MRI (fMRI). These three types of scans allow researchers to see what the brain is doing at a given point in time. An **electroencephalogram (EEG)** is an amplified recording of the waves of electrical activity that sweep across the brain's surface. These electrical waves are measured by electrodes placed on the scalp. EEGs are often the tool of choice for diagnosing sleep disorders and seizure disorders. A **positron emission tomography (PET) scan** is a visual display of brain activity. Researchers inject a radioactive form of glucose (blood sugar) into a person, and the PET scan detects where it goes in the brain while the person performs a given task. PET and fMRI scans track the flow of blood to help identify which parts of the brain are active during a particular task. Such scans have taught us, for example, that the occipital lobes are responsible for visual processing and that facial recognition occurs in the temporal lobes.

Phineas Gage remains famous for his tragic contribution to psychological knowledge. We are fortunate that new scanning techniques have made it possible to learn more about the brain with less human suffering. Consider what new "windows to the brain" will open up during your lifetime! Perhaps you will help develop one of them.

electroencephalogram (EEG) An amplified recording of the waves of electrical activity that sweep across the brain's surface; these waves, measured by electrodes placed on the scalp, are helpful in evaluating brain function.

positron emission tomography (PET) scan A visual display of brain activity.

brainstem The oldest part and central core of the brain; it begins where the spinal cord swells as it enters the skull and is responsible for automatic survival functions.

PAUSE NOW OR MOVE ON

Turn to page 92 to review and apply what you've learned.

Lower-Level Brain Structures

WHAT'S THE POINT?

5-2 What kinds of behaviors and thoughts are controlled by the innermost parts of our brain, the lower-level brain structures?

The innermost structures of your brain are similar to the brains of all mammals. They are at the core because they evolved first. The newer regions are layered on top, much as paint builds up on the walls of older houses. In this section, we examine some of the innermost structures, called lower-level brain structures. They include the brainstem, the thalamus, the cerebellum, and the limbic system.

The Brainstem

No structural point marks where the brain and the spinal cord meet. You can either think of the brain as a rose that has blossomed on top of a stem or think of the spinal cord as a tail that extends down from the brain. Your choice! The **brainstem** is the oldest part and central core of

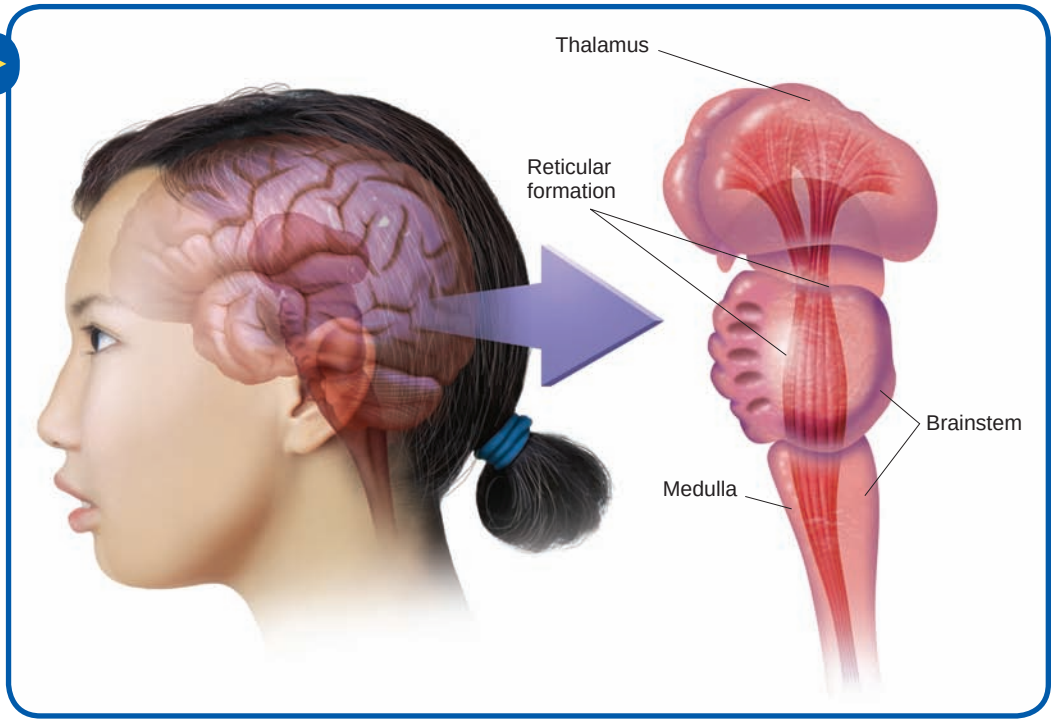


Figure 5.4
The Brainstem and the Thalamus

The brainstem is a swelling at the top of the spinal cord. The medulla and reticular formation support fundamental processes like breathing and wakefulness. The thalamus, perched on top, routes sensory information to the proper regions of the brain.

medulla [muh-DUL-uh] Located at the base of the brainstem, it controls basic life-support functions like heartbeat and breathing.

reticular formation A nerve network in the brainstem that plays an important role in controlling wakefulness and arousal.

the brain. It begins where the spinal cord swells as it enters the skull (see **Figure 5.4**).

Located at the base of the brainstem, the **medulla** controls basic life-support functions such as heartbeat, breathing, circulation, and swallowing. Don't hurt yours—damage in this region would almost certainly lead to death.

Another part of the brainstem is the **reticular formation,** a nerve network that plays an important role in controlling wakefulness and arousal. The reticular formation follows the back of the spinal cord as it rises into the brain. Damage to this region would cause a coma.

The Thalamus

The **thalamus,** Greek for "inner chamber," is located at the top of the brainstem in the middle of the brain. The thalamus is the brain's sensory switchboard, and it directs messages to the sensory receiving areas in the cortex. Have you ever seen a photograph of an old-fashioned telephone switchboard, with an operator plugging in cords to route calls to the proper phone? Such is the role of the thalamus. The incoming fibers of all your senses (except smell) funnel into the thalamus, which then distributes the sensory information to the proper regions of the brain for processing.

● Ever notice how easily smell triggers memories? Smell information bypasses the thalamus and is routed directly to memory and emotion centers in the brain. This may be why the smell of your grandparents' house or a hospital ward can unleash a flood of emotions, sometimes positive and sometimes negative.

The Cerebellum

The **cerebellum,** Latin for "little brain" (and it does look a bit like an extra minibrain), is attached to the rear of the brainstem. In conjunction with other brain regions, your cerebellum controls voluntary movements and balance

AP PHOTO/KATHY WILLENS, FILE

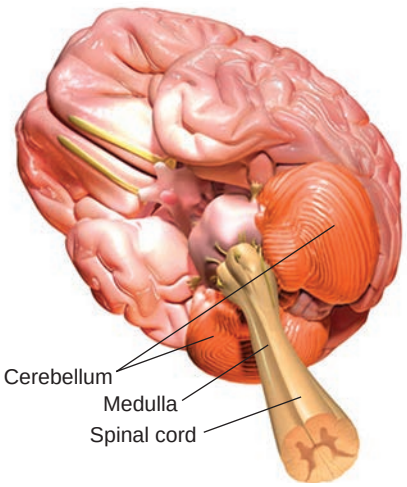


Figure 5.5
The Cerebellum

The cerebellum is obvious as it juts out from the bottom rear of the brain. Its primary role is coordination and balance. Joe Mauer would be unable to make contact with a baseball if his cerebellum weren't working properly.

(see **Figure 5.5**). Research has shown the cerebellum plays a role in governing emotions, hearing, and touch (Bower & Parsons, 2003). The cerebellum also controls memories for knowing how to use your body for things like walking or playing the guitar. The cerebellum makes it possible to smoothly engage in tasks such as running or writing. If your cerebellum were damaged, you could still decide to move your feet, but you would lose much of the coordination and balance required for dancing well. You could move your hands, but you would lose the dexterity required to play the guitar.

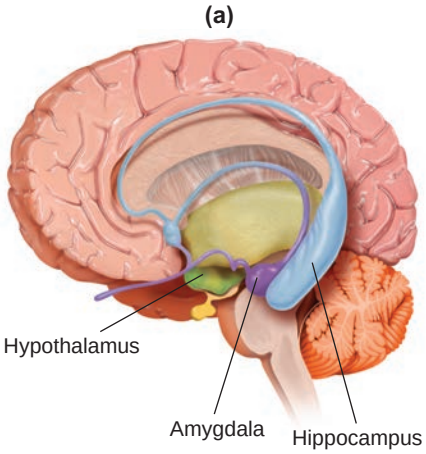
thalamus [THAL-uh-muss] The brain's sensory switchboard, located on top of the brainstem; it directs messages to the sensory receiving areas in the cortex.

cerebellum [sehr-uh-BELL-um] The "little brain" attached to the rear of the brainstem; it helps coordinate voluntary movements and balance.

limbic system A ring of structures at the border of the brainstem and cerebral cortex; it helps regulate important functions such as memory, fear, aggression, hunger, and thirst, and it includes the hypothalamus, the hippocampus, and the amygdala.

The Limbic System

As you can see from **Figure 5.6,** the **limbic system** (Latin for "border"), is a ring of structures at the border of the brainstem (the older core regions) and the cerebral cortex (the more recently developed surface regions). The limbic system helps regulate important functions such as memory, fear, aggression, hunger, and thirst. The limbic system includes the hypothalamus, the hippocampus, and the amygdala.



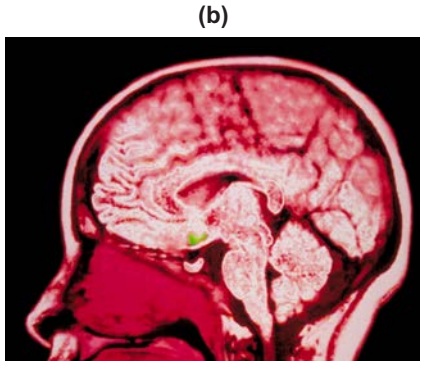


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Figure 5.6
The Limbic System

(a) The limbic system is a ring of structures (including the hippocampus, amygdala, and hypothalamus) surrounding the thalamus and forming a border between the brainstem (the older core regions) and the cerebral cortex (the more recently developed surface regions). (b) The hypothalamus is tiny, but it plays a huge role in regulating responses ranging from thirst to pleasure. The hypothalamus is the green-colored region in this MRI brain scan.

hypothalamus [hi-po-THAL-uh-muss] A neural structure lying below the thalamus; it helps regulate many of the body's maintenance activities, such as eating, drinking, and body temperature, and is linked to emotion.

hippocampus A neural center located in the limbic system that wraps around the back of the thalamus; it helps process new memories for permanent storage.

amygdala [uh-MIG-duh-la] An almond-shaped neural cluster in the limbic system that controls emotional responses, such as fear and anger.

Of the many structures in the limbic system, perhaps the most important is the **hypothalamus,** a neural structure lying beneath the front of the thalamus (*hypo* means "beneath"). The hypothalamus helps regulate many of your body's maintenance functions, including hunger and thirst, the fight-or-flight reaction to stress, and body temperature. The hypothalamus also plays a large role in the experience of emotion, pleasure, and sexual function. Cell for cell, it would be hard to identify a more crucial brain part.

Two other vital structures in the limbic system are the hippocampus and the amygdala. The **hippocampus,** which looks vaguely like a seahorse (you guessed it—*hippo* is Greek for "horse"), is a neural center that wraps around the back of the thalamus and helps process new memories for permanent storage. The **amygdala** (from the Greek for "almond") is an almond-shaped structure in the limbic system. The amygdala controls many of your emotional responses, especially emotions like fear and anger.

PAUSE NOW OR MOVE ON

Turn to page 92 to review and apply what you've learned.

The Cerebral Cortex

WHAT'S THE POINT?

5-3 What are the regions of the outer surface of the brain, the cerebral cortex, and what are the functions of these regions?

Close your eyes and conjure up an image of a brain. What did you see? Probably not the lower-level structures we have been discussing, right? More likely, you thought of the brain's wrinkled outer surface—the **cerebral cortex** (see Figure 5.7), an intricate fabric of interconnected neurons that make up the

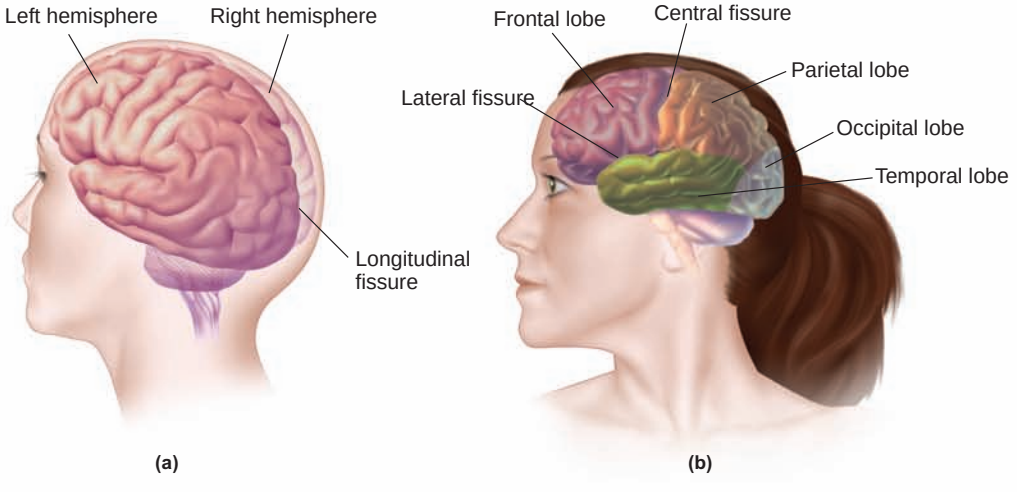


Figure 5.7
Basic Landmarks of the Cerebral Cortex

The cerebral cortex is the wrinkled outer surface of the brain. It is divided by fissures into two hemispheres (a) and four major lobes (b).

body's ultimate control and information-processing center. The cerebral cortex covers the brain's lower-level structures, just as a glove covers your hand. The word *cortex* derives from the Latin word for "bark," an appropriate name given the tree bark–like appearance of the brain's outer surface. The wrinkles of the cerebral cortex allow more brain tissue to be packed into a confined space, like a sleeping bag into its stuff sack. Thanks to this efficient use of space, an estimated 20 to 23 billion neurons can exist in a layer of brain tissue only one-eighth of an inch thick (de Courten-Myers, 2002). Even more amazing, there are several times as many glial cells sharing this space with the neurons. These glial cells assist and support the neurons, much as paramedics assist and support the work of physicians (Miller, 2005).

cerebral [seh-REE-bruhl] cortex The intricate fabric of interconnected neurons that form the body's ultimate control and information-processing center.

longitudinal fissure The long crevice that divides the cerebral cortex into the left and right hemispheres.

corpus callosum [KOR-pus kah-LOW-sum] The large band of neural tissue that connects the two brain hemispheres and allows them to communicate with each other.

frontal lobes The portion of the cerebral cortex lying just behind the forehead that is involved in planning and judgment; it includes the motor cortex.

Major Divisions of the Cortex

The most dramatic feature of the cortex is the **longitudinal fissure,** the crevice that divides the cerebral cortex into two halves called *hemispheres* (see Figure 5.7a). If you were to poke your pencil down this fissure (not that you should try this, mind you), you would eventually meet resistance at the **corpus callosum,** a large band of neural tissue that connects the two brain hemispheres and allows them to communicate with each other. The corpus callosum is clearly visible in **Figure 5.8.**

If you look back at Figure 5.7a (and use your imagination), you may note that the brain resembles a side view of a boxing glove. If you make your way around the boxing glove, you can see that additional fissures—a lateral fissure and a central fissure—create major divisions of tissue on each side. These divisions create four brain lobes—frontal, parietal, occipital, and temporal (see Figure 5.7b). Lying just behind the forehead, the **frontal lobes** (left hemisphere and right hemisphere) enable your most advanced cognitive (thinking) abilities, such as judgment and planning. The frontal lobes' rational abilities literally lie atop, and connect with, the more primitive limbic region where the roots of emotion are found. This means that both emotion and reason are going to influence the decisions you make. The frontal lobes include the motor cortex (discussed later).

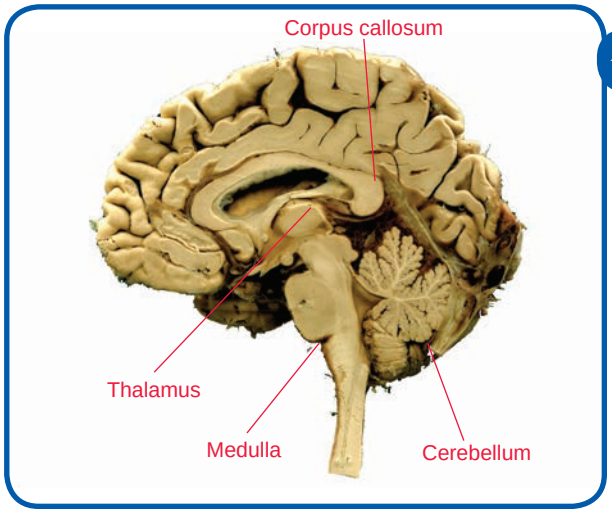


Figure 5.8
The Corpus Callosum

The corpus callosum is clearly visible in this photograph of a brain, made by cutting straight down through the longitudinal fissure. You can also see other structures we have discussed: the thalamus, the medulla, and the cerebellum.

parietal [puh-RYE-uh-tuhl] lobes The portion of the cerebral cortex lying at the top of the head and toward the rear; it includes the somatosensory cortex and general association areas used for processing information.

occipital [ahk-SIP-uh-tuhl] lobes The portion of the cerebral cortex lying at the back of the head; it includes the primary visual processing areas of the brain.

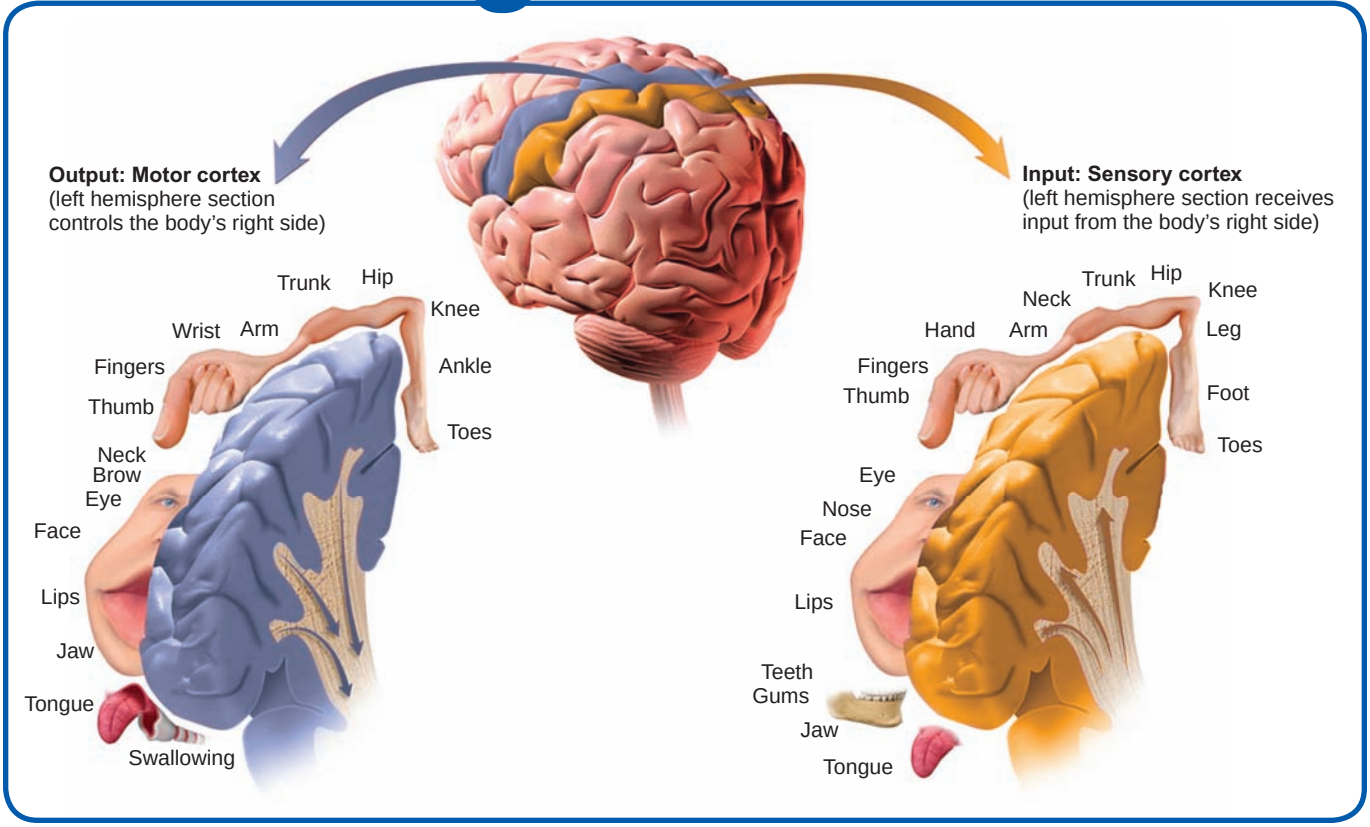
Behind the frontal lobes, at the top of the head and toward the rear, are the **parietal lobes.** The parietal lobes include the somatosensory cortex (discussed later), but they are largely designated as *association areas*—regions available for the general processing of information, including much mathematical reasoning and integration of memory. At the rear of the cerebral cortex are the **occipital lobes,** the primary visual processing areas of the brain. You may not have eyes in the back of your head, but you do see with the back of your brain. Finally, the thumb region of the boxing glove, lying roughly above the ears, holds the **temporal lobes,** which include the auditory (sound) processing areas of the brain.

Movement and Feeling

Have you ever wondered how your brain tells your body parts to move? What happens in your brain to let you walk, raise your hand, or wiggle your ears? Is there a specific spot where these things happen? The answer is *Yes*. The **motor cortex** is a strip of tissue on the rear edge of the frontal lobes that controls voluntary movements of your body parts (see **Figure 5.9**). Different points on the motor cortex control different parts of your body, but they do so in a curious cross-wired pattern. Thus, the motor cortex in your right hemisphere takes care of movement on the *left* side of your

Figure 5.9
The Motor Cortex and the Somatosensory Cortex

On both sides of the central fissure, two strips of brain tissue handle information flowing from your senses to your body parts. The motor cortex is part of the frontal lobes, and the somatosensory cortex is part of the parietal lobes. The figure drawn on the expanded version of each strip roughly represents the amount of brain tissue devoted to particular body parts.



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When Does One Point Become Two?

Your sensitivity to touch increases as you move down the inside of your forearm toward your wrist and the palm of your hand. To test this yourself, unfold a paper clip so the two tips are about half an inch apart. Then drag the two-pointed clip slowly and gently down a friend's arm while he has his eyes closed. If all goes well, your friend will report that the two tips of the paper clip feel like one point when they are higher on his arm. The two tips will begin to feel like two points lower on the arm as you approach the wrist again. This happens because the wrist and hand have more brain tissue on the somatosensory cortex, and thus more sensitivity, than does the upper arm.

body, and the motor cortex in your left hemisphere controls movement on the *right* side of your body.

Another odd thing about the motor cortex is that the bigger parts of your body don't have the largest amount of brain area. Instead, the parts of the body that are capable of more intricate movements (like the hands and the face) demand more brain tissue than body parts for which intricate movement is not possible (like the arm and the ankle). If you were to draw a body along the motor cortex so that the body parts were proportionate to the amount of brain tissue, you would have a distorted drawing indeed, like the one in Figure 5.9.

Just behind the motor cortex, a similar strip of tissue stretches along the front edge of the parietal lobes. This is the **somatosensory cortex,** a brain area that registers and processes body sensations. This term sounds more difficult than it really is. If you remember that *soma* is Greek for "body," you'll remember that this strip of cortex is where your body senses register. For example, when you feel a tickle under your nose or the pain of a stubbed toe, your brain will register that stimulation in the somatosensory cortex. As you can see in Figure 5.9, the somatosensory cortex allots more brain tissue to parts of your body that are more sensitive to touch (like your fingertips) than to those that are less sensitive (like your arms).

temporal lobes The portion of the cerebral cortex lying roughly above the ears; it includes the auditory (hearing) areas of the brain.

motor cortex A strip of brain tissue at the rear of the frontal lobes that controls voluntary movements.

somatosensory cortex A strip of brain tissue at the front of the parietal lobes that registers and processes body sensations.

Brain Plasticity

The brain has an extraordinary ability to compensate for damage or injury. While damage to the brain is always serious, under some circumstances, especially in young people, the cerebral cortex can actually "reprogram" itself to compensate for a problem. For example, if a tumor in one brain

plasticity The brain's ability to change, especially during childhood, by reorganizing after damage or experience.

hemisphere starts to disrupt language ability, language function may transfer to the other hemisphere (Thiel et al., 2006). This remarkable ability is called **plasticity.**

The brain's plasticity is what makes some forms of therapy effective. There was a stroke victim who lost much of the ability to use his arm. His therapists did not allow him to use his good arm. By forcing him to use the damaged arm, he gradually regained function as his brain adjusted to the forced usage. Eventually, he was able to write and play tennis with the arm (Doidge, 2007). (See Thinking About Positive Psychology: The Positive Neuroscience Project to learn about other innovative brain research.)

Thinking About POSITIVE PSYCHOLOGY

The Positive Neuroscience Project

While considerable research in neuroscience has focused on disease, dysfunction, and the harmful effects of stress and trauma, very little is known about the neural mechanisms of human flourishing. Creating this network of future leaders in positive neuroscience will change that.

—Martin Seligman

Written into a multimillion-dollar grant proposal, those words helped the University of Pennsylvania's Positive Psychology Center obtain the support necessary to fund a number of research projects collectively called the Positive Neuroscience Project (www.posneuroscience.org). The projects selected to receive funding all study how the brain enables human flourishing.

Program director Denise Clegg (2009) notes that to qualify for grant money, proposed research ideas need to fall into one of the following categories (adapted from www.posneuroscience.org/research-awards.html):

1. *Virtue, strength, and positive emotion:* What are the neural bases of cognition that enable virtues such as persistence, honesty, compassion, love, curiosity, courage, and creativity?
2. *Exceptional abilities:* What is special about the brains of exceptional individuals? Can we learn from them?
3. *Meaning and positive purpose:* How does the brain enable us to find meaning and achieve goals?
4. *Decisions, values, and free will:* How does the brain enable decisions based on values, and how can decision making be improved?
5. *Beliefs and meditation:* How do religious and spiritual practices affect neural function and behavior?

The wide range of topics being studied is impressive, ranging from attempting to understand the neurological differences between highly nurturing and less nurturing fathers to exploring the brains of people who flourish in the face of stress that would cripple others. Other studies seek to find the neural link between stressful events and the ability to bounce back from stress, and still others attempt to locate where positive emotions originate in the brain.

This exciting research is just getting under way. Those wishing to get updates as studies are published can write to info@posneuroscience.org.

PAUSE NOW OR MOVE ON

Turn to page 93 to review and apply what you've learned.

Differences Between the Brain's Two Hemispheres

Broca's area A brain area of the left frontal lobe that directs the muscle movements involved in speech.

Wernicke's [VER-nik-ees] area A brain area of the left temporal lobe involved in language comprehension and expression.

WHAT'S THE POINT?

5-4 Are the left hemisphere and the right hemisphere responsible for different thoughts and behaviors?

Have you ever heard people speak of the "right brain" and the "left brain" or even describe someone as being "left-brained" or "right-brained"? Like many popular ideas, this pop psychology notion is partly right and partly wrong. In truth, you have only one brain, not two. Yes, your single brain *is* divided into two hemispheres, and some functions differ significantly between the two halves. But the two sides of your brain are allies, not enemies. They communicate constantly via the corpus callosum, and to accomplish most tasks you must use both the right side and the left side of your brain.

Language and Spatial Abilities

Language is the best example of a clear-cut difference in the functions of your brain's two hemispheres. In most people, language functions are located primarily in the left hemisphere. A small percentage of the population seems to be "wired" for language in the right hemisphere, but nobody is quite sure why.

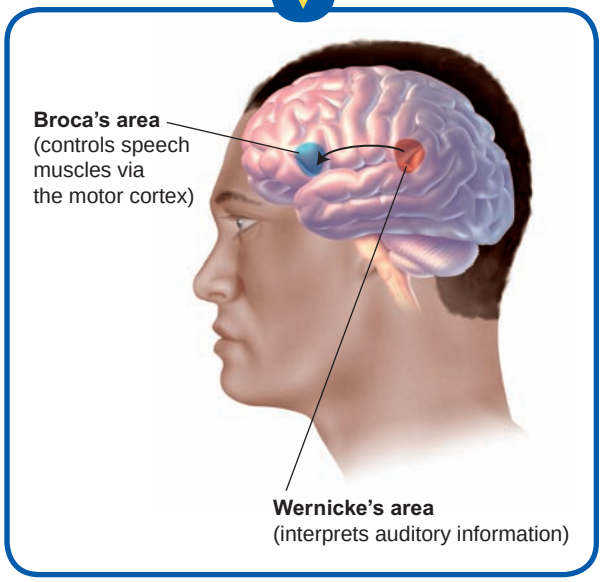
Two particularly important language regions of the left hemisphere are Broca's area and Wernicke's area (see **Figure 5.10**):

- **Broca's area,** located in the left frontal lobe, directs the muscle movements involved in *expressive language* (speech). Damage to Broca's area, which often happens to victims of strokes, results in difficulty with spoken language. The stroke victim can form ideas but cannot turn those ideas into coherent speech.
- **Wernicke's area,** located in the left temporal lobe, is involved with *receptive language* (your ability to understand what someone else says). Damage to Wernicke's area might leave a person able to hear words but unable to comprehend the meaning of sentences created with the words. She would be able to recognize the individual parts of a computer (monitor, mouse, keyboard, and so on) but not understand that these parts, together, create a computer.

The right hemisphere, however, is not just a bystander. It houses most of your brain's *spatial* abilities. The word spatial relates to your ability to perceive or organize things in a given space, such as judging distance, understanding geometric objects, or packing a car's trunk. The right hemisphere also provides the insight to help us make

Figure 5.10
Broca's Area and Wernicke's Area

These two language areas are found only in the left hemisphere in most people.



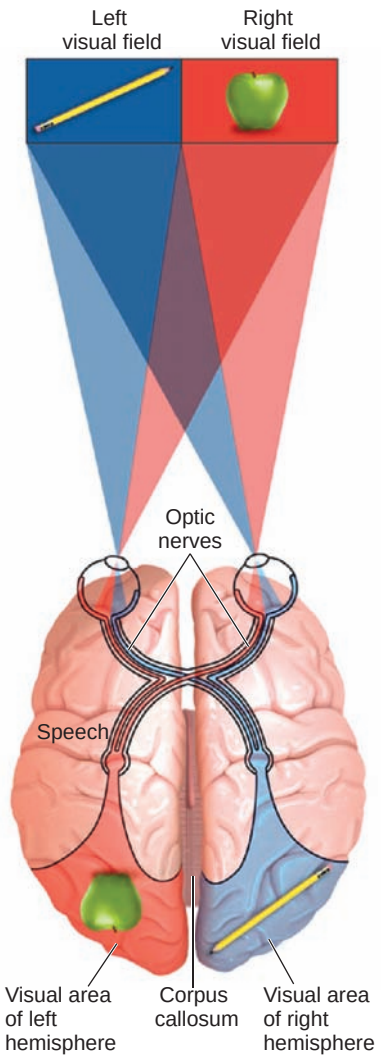


Figure 5.11
The Flow of Visual Information

Both eyes receive information from both visual fields, but all information from the left visual field ends up in the right hemisphere. The right visual field is processed in the left hemisphere. When the corpus callosum is cut, the two hemispheres cannot share information.

connections among words. What word goes with painting, ring, and nail? Our right hemisphere finds the answer: *finger.* For a small handful of people with surgically severed corpus callosums, however, the differing roles of the two hemispheres are much more dramatic.

The Split Brain

What would happen if the two halves of your brain were separated? Could you still function as a normal person? Why would anyone even consider such a dramatic procedure?

The last question is the easiest to answer. In the 1960s, scientists were working on ways to treat severe epilepsy, a brain disorder in which a person has uncontrollable seizures. In an attempt to prevent these seizures from spreading from one side of the brain to the other, surgeons performed a "split-brain" operation in which they cut the corpus callosum. The operation was successful—seizures no longer plagued the patients whose brains were split—but there were side effects.

Cutting the corpus callosum prevents the two hemispheres of the brain from communicating with each other. Surprisingly, psychologists Roger Sperry and Michael Gazzaniga (1983, 1988) found that the surgery left patients' personality and intellect unchanged. However, it altered perception—and corresponding behaviors—in some interesting ways. To understand why these changes occurred, we need to take a closer look at the roles of the two hemispheres.

As you can see in **Figure 5.11,** we normally route visual information efficiently from the eyes to the brain. The important thing to notice is that information from your left visual field (the area to the left of your nose) falls on the right side of the retina at the back of each of your two eyes. In an intact brain, this design includes distributing the information across the corpus callosum so that the visual information is available to both hemispheres.

So, what happens when the information is *not* shared between the two hemispheres? In cleverly designed experiments, Gazzaniga and Sperry asked split-brain patients to focus on a spot at the center of a screen while images were projected to either the left or the right visual field (Gazzaniga, 1983). The results demonstrated some interesting gaps in perception among people whose corpus callosum had been severed. Here are two examples:

1. When the picture of an item was projected to the *left visual field,* the patient was unable to identify the object verbally. Why? Because information from the left visual field is processed in the right hemisphere, but the speech center is located in the left hemisphere. There is no way to move the information from the right to the left hemisphere if the corpus callosum has been cut.
2. Look at the situation in **Figure 5.12.** In this case, the split-brain patient focuses on the dot while the HE is projected to the left visual field and ART is projected to the right visual field. The results are perfectly predictable, based on our understanding of the way the brain is organized. The patient will respond ART when asked what was seen, but to her own surprise will

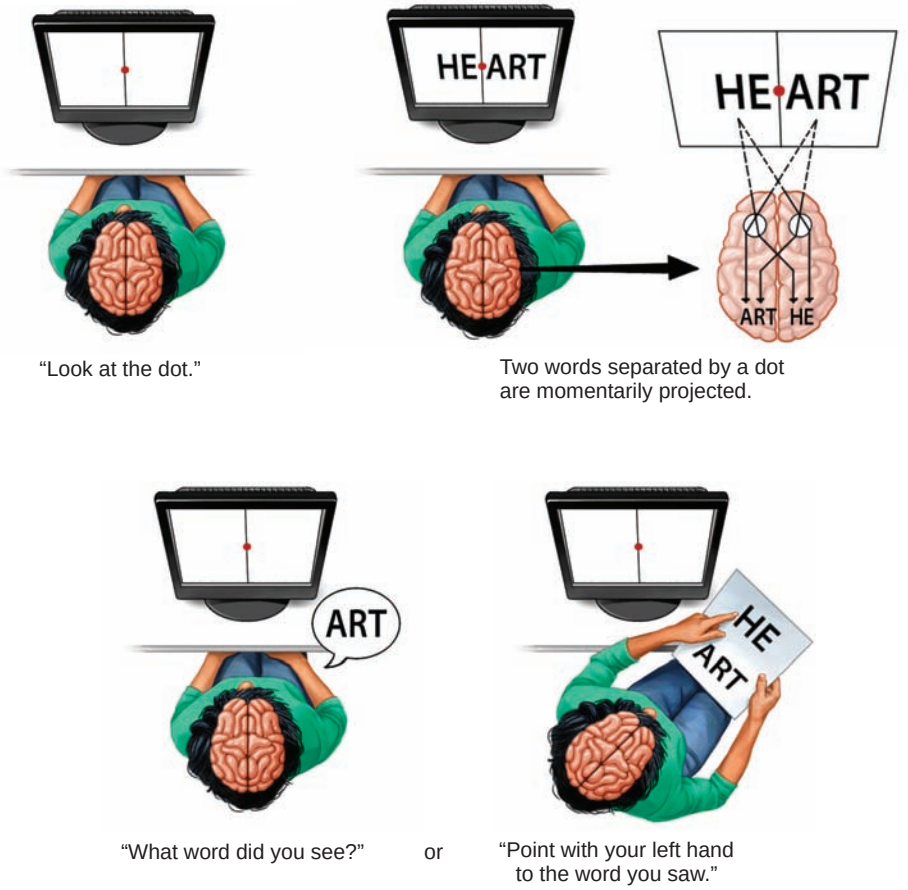


Figure 5.12
Wonders of the Split Brain

This split-brain patient *says* she sees only the word ART because the speech center can receive information only from the left hemisphere, which processes the right visual field. Her left hand *points* to HE because it's controlled by the right hemisphere. The right hemisphere can process information only from the left visual field.

point to the word HE when asked to use her left hand to identify what she saw. What would the person do if asked to use her right hand to select the word she saw? That's right—she would point to ART. And, of course, a person with an intact corpus callosum would see the whole word, HEART.

These results are pretty strange—a bizarre but literal case of the left hand not knowing what the right hand is doing. Why, then, did the researchers conclude that the side effects of the surgery were minimal? Remember that to find these results, Sperry and Gazzaniga set up a procedure that required participants to focus on a dot at the center of the visual field. In real life, split-brain patients would be constantly moving their heads and eyes from side to side. Both visual fields would continually detect significant amounts of information and would make that information available to both brain hemispheres, despite the severed corpus callosum.

This is not to say the split-brain procedure has no lingering aftereffects. People who have had this surgery know that the left and right sides of the body seem at times to be under the command of different masters (because they are). When there is a conflict between the two hemispheres, the left brain usually tries to make sense of it all (Gazzaniga, 1988). Thus, if the right hemisphere of the brain implements a behavior, like walking, the left hemisphere will try to explain the reason ("I'm going to get a Coke"). It must be unnerving to have a brain at odds with itself, but these strange events would not significantly reduce a person's ability to function, and they usually would not be obvious to other people.

This unique attempt to control epileptic seizures yielded important information about the role of the brain's two hemispheres. The information has since been verified with modern brain-scanning techniques that were not available in the 1960s. Maybe the most important lesson of this research relates to the vital communication that travels between the hemispheres via the corpus callosum. Our left and right hemispheres form one, integrated brain. A recent book on the great myths of popular psychology reminds us that those trying to sell us products to develop one side of the brain or the other are more interested in our bank accounts than in science (Lilienfeld et al., 2010).

PAUSE NOW OR MOVE ON

Turn to page 93 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 5

Thinking About the Brain

Studying the Brain

WHAT'S THE POINT?

5-1 What tools are available to psychological scientists for studying the brain?

- Case studies of brain injuries were the only method available before more current technological advances.
- Brain-scanning techniques can reveal a range of information about brain structure and function.
  - CT and MRI scans provide detailed images of brain structures.
  - EEGs reveal brain waves, an indication of brain activity levels.
  - PET and fMRI scans can provide information about activity levels of different regions of the brain.

Apply What You Know

1. The in-depth examination of the results of Phineas Gage's brain injury is an example of a(n) _____.
2. Which of the following tools is most likely to be used by a researcher who needs to measure activity levels in the brain?
   a. EEG
   b. MRI
   c. CT
   d. PET

Lower-Level Brain Structures

WHAT'S THE POINT?

5-2 What kinds of behaviors and thoughts are controlled by the innermost parts of our brain, the lower-level brain structures?

- The innermost parts of our brain, the lower-level brain structures, control basic life-support functions, such as breathing, wakefulness, muscle coordination, and routing sensory messages.
- The limbic system is key to our emotional experiences and memory system.

Apply What You Know

3. Damage to the brain's _____ would be life-threatening.

a. hippocampus
b. cerebellum
c. medulla
d. amygdala

4. The brain's _____ helps process new memories.

The Cerebral Cortex

WHAT'S THE POINT?

5-3 What are the regions of the outer surface of the brain, the cerebral cortex, and what are the functions of these regions?

- The four lobes of the cerebral cortex perform many functions, but the primary ones can be summarized as follows: The (left and right) frontal lobes control judgment and planning, the parietal lobes control general processing of information, the temporal lobes process auditory signals, and the occipital lobes process visual signals.
- Two of the most important specialized cortexes of the cerebral cortex are the motor cortex and the somatosensory cortex.

Apply What You Know

5. Describe where the brain processes movement and body sensations.
6. The large band of neural tissue that connects the two brain hemispheres is the _____.

Differences Between the Brain's Two Hemispheres

WHAT'S THE POINT?

5-4 Are the left hemisphere and the right hemisphere responsible for different thoughts and behaviors?

- Two regions in the left hemisphere, Broca's and Wernicke's areas, coordinate to allow speech.
- The right hemisphere seems to be more responsible for some spatial reasoning and word-association tasks.

Apply What You Know

7. One method of examining differences between the two hemispheres is to study patients
   a. with split corpus callosums.
   b. who were born with no brainstem.
   c. who developed both a left and a right frontal lobe.
   d. with a limbic system that includes both a hippocampus and an amygdala.
8. _____ area controls expressive speech and _____ area controls receptive speech.

KEY TERMS

case study, p. 79
computerized axial tomography (CT or CAT), p. 80
magnetic resonance imaging (MRI), p. 80
electroencephalogram (EEG), p. 81
positron emission tomography (PET) scan, p. 81
brainstem, p. 81
medulla [muh-DUL-uh], p. 82
reticular formation, p. 82
thalamus [THAL-uh-muss], p. 82
cerebellum [sehr-uh-BELL-um], p. 82
limbic system, p. 83
hypothalamus [hi-po-THAL-uh-muss], p. 84
hippocampus, p. 84
amygdala [uh-MIG-duh-la], p. 84
cerebral [seh-REE-bruhl] cortex, p. 84
longitudinal fissure, p. 85
corpus callosum [KOR-pus kah-LOW-sum], p. 85
frontal lobes, p. 85
parietal [puh-RYE-uh-tuhl] lobes, p. 86
occipital [ahk-SIP-uh-tuhl] lobes, p. 86
temporal lobes, p. 86
motor cortex, p. 86
somatosensory cortex, p. 87
plasticity, p. 88
Broca's area, p. 89
Wernicke's [VER-nik-ees] area, p. 89

Sensation and Perception

MODULES

6 Sensation

7 Perception

Without sensation and perception, you could not read this book, find food, communicate with others, or experience any of the joys (or challenges) of life on planet Earth. No vision, no hearing, no taste, no smell, no touch, no movement—in a nutshell, you would have no way to make "sense" of the world outside your body.

Sensation and perception are closely related phenomena, but *sensation* is the process of being aware and *perception* is the process of interpretation. Sensation processes information from the *bottom up*. Your vision, hearing, and other senses make you aware of the raw sensory information from the world around you. But what meaning do you assign to all this sensory information? That's where perception comes in. Your memories, emotions, and experiences all affect how you perceive, or interpret, the world around you through *top-down processing*. Attending a volleyball match with a friend, you both may be sensing all the same sights and sounds, but you may have different perceptions, especially if you are cheering for different teams.

Now it's time to sense and perceive the material in Module 6. Happy processing!

MODULE 6

Sensation

Ah, the thrill of a roller coaster is created by a wild combination of sensory experiences. Keep your eyes peeled as you read about vision and your other senses.

Basic Principles
- Thresholds
- Signal Detection Theory
- Sensory Adaptation
- Selective Attention

The Visual System
- The Nature of Light
- The Structure of the Visual System
- Color Vision

Hearing
- The Nature of Sound
- The Structure of the Auditory System
- Sound Localization

Other Senses
- Taste
- Smell
- Touch
- Body Senses

Stop for a moment to consider the amazing volume of information you're gathering right now. Begin by checking out the visual richness of your present environment. What kinds of shapes are present? Are people or things moving? How many colors can you detect? And vision is just one of your sensory systems. What sounds are you listening to? What can you feel? The texture of your clothing? Pressure from the chair you're sitting on? And what can you taste or smell? This awareness of the world around you is **sensation.** Your nervous system sorts through all this incoming sensory information by using **bottom-up processing,** a form of information processing that analyzes the raw stimuli entering through your many sensory systems.

The analysis of sensory information that takes place during bottom-up processing is part of **perception,** the process of organizing and interpreting incoming sensory information. *Sensation* allows you to know that an object is a red sphere; that it has a cool, hard surface; and that it fits comfortably in your hand. The object has a pleasant aroma when you smell it and a satisfying crunch when you bite into it. When chewed, it produces a taste both sweet and tart. Analysis of this bottom-up stream of data leads to the *perception* that you're eating an apple.

sensation The process by which sensory systems (eyes, ears, and other sensory organs) and the nervous system receive stimuli from our environment.

bottom-up processing Information processing that analyzes the raw stimuli entering through the many sensory systems.

perception The process of organizing and interpreting incoming sensory information.

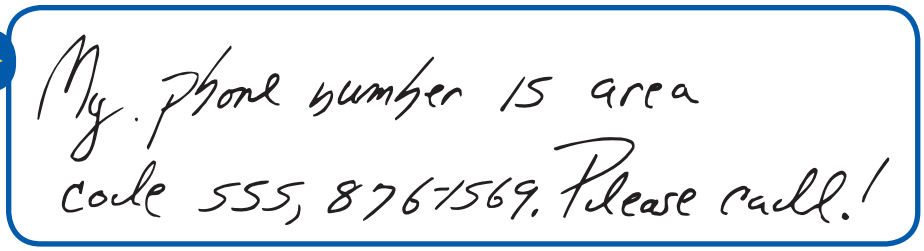


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Figure 6.1
Sensation and Perception

Read these sentences carefully and you will note some odd things about them. The marks you interpreted as the word *is* in the top line are exactly the same marks you interpreted as *15* in the phone number. Can you find other examples of the same marks being interpreted two ways? Here is where sensation and perception come together. Sensation involves moving the image from the book to your brain, a bottom-up process of gathering environmental information through the senses. Perception involves knowing what to make of the individual marks in the sentence. This top-down interpretation relies on your experiences with, and expectations about, language. Did you find the other examples? The same mark represents *h* and *b*, and the same mark represents *d* and *l*.

Perception is also influenced by **top-down processing,** information processing that draws on our experiences and expectations to interpret incoming sensations. Do you expect caramel-covered apples to taste great? I do, but I approach them with far more caution than most people because a friend of mine once tricked me into biting into a caramel-covered onion. It looked (and crunched) just like a caramel-covered apple, but it sure didn't taste like one! My perception of caramel-covered apples as a potential prank is an example of top-down processing produced by my experiences. For another example of top-down processing, see **Figure 6.1.**

Sensation and perception are two sides of the same coin. They can't be separated because these processes blend together in our everyday experiences. In an effort to keep the information simple and organized, however, we consider sensation in this module and save perception for the next. We begin with some basic principles of sensation and then turn our attention to the various sensory systems we use. I hope you find it as *sensational* as I do!

Basic Principles

WHAT'S THE POINT?

6-1 What's a possible real-life application of thresholds, signal detection, sensory adaptation, and selective attention?

Sensation is governed by basic principles that determine how we process stimulation from the environment. In this section, you will learn how thresholds, signal detection, sensory adaptation, and selective attention influence the stream of information available to you.

Thresholds

top-down processing Information processing that draws on expectations and experiences to interpret incoming sensory information.

absolute threshold The minimum amount of stimulation needed to detect a particular stimulus.

A *threshold* is an edge, a boundary. One of the thresholds that interests psychologists is the **absolute threshold,** the minimum amount of stimulation needed to detect a particular stimulus. For example, the dimmest visible star in the sky would be right at the absolute threshold for vision because it is just barely bright enough for you to see. Likewise, the least amount of basil you can taste in the spaghetti sauce would be at the absolute threshold for taste. Humans have absolute thresholds that are low enough to detect most significant events that occur in our environment. According to one estimate, a person with normal

vision in total darkness can detect the light of a single candle 30 miles away (Galanter, 1962)! If your hearing had a lower absolute threshold, you might constantly be distracted by the sound of blood pulsing near your ears. We have sensitive senses. (For more on what this might mean, see Thinking Like a Psychological Scientist: Can Subliminal Messages Improve Your Memory?)

difference threshold (just noticeable difference, or jnd) The minimum amount of difference needed to detect that two stimuli are not the same.

Another type of threshold is the difference threshold, also called the just noticeable difference (jnd). As you might expect, the **difference threshold** represents an edge, too—this time, the minimum difference to detect that two stimuli are not the same. How much does the volume have to increase before you can tell that the music playing from your stereo has become louder? How much do the laces on your hiking boots need to be loosened so that they feel slightly less tight? How much does the room have to cool down before you realize there's a problem with the heating system? These are examples of the difference threshold—the smallest detectable change in a stimulus.

HEMIS/ALAMY IMAGES

Making a Living on the Just Noticeable Difference

People who have an unusual ability to detect very small differences between stimuli can often make high salaries doing so. This perfume tester in Paris can identify subtle aromas that will make perfumes more pleasing.

Thinking Like a PSYCHOLOGICAL SCIENTIST

Can Subliminal Messages Improve Your Memory?

Perhaps you've heard about subliminal messages. A Google search on the term turns up over half a million hits. One website near the top of the list promises subliminal programs that will improve your memory, make you rich, cause you to lose weight, and develop an extroverted personality, among the over 200 programs available at special sale prices. Each inserts messages, played at a frequency you cannot consciously perceive, into the sound of ocean surf. There are personal testimonials speaking to the success of the programs. And if you don't find this particular company to your liking, there are dozens of others ready to collect your money.

Can this really be? Is it possible to utilize these subliminal—the word means "below threshold"—messages to learn foreign languages, become more confident in relationships, and improve your athletic performance? Unfortunately, like so many other things that seem too good to be true, the research doesn't support the claims.

It *is* true that you can be influenced by a stimulus you are unaware of. In one experiment, participants were shown a brief image of an emotionally positive scene (like kittens) or an emotionally troubling scene (like a dead body) so quickly that the scene registered only as a flash of light. These subliminal messages were enough to influence the participants' perceptions of how nice a person looked when asked to rate a photo right after exposure to the emotionally charged flash (Krosnick et al., 1992).

These fleeting subliminal influences, however, are a far cry from the claims of the marketing companies. To test these claims, one study had college students listen to subliminal tapes that were supposed to improve their memory or enhance their self-esteem. While students believed the tapes were effective, the researchers did not discover any real changes (Greenwald et al., 1991). Studies do not show the kinds of large, lasting effects that would be necessary for us to conclude that subliminal programs work. Alas, if you want to improve your memory, you're probably going to have to work at it.

signal detection theory A theory that predicts how and when we detect the presence of a faint stimulus (signal) amid background stimulation (noise).

sensory adaptation Diminished sensitivity to constant and unchanging stimulation.

selective attention Focusing conscious awareness on a particular stimulus to the exclusion of others.

Signal Detection Theory

Is that image on the airport security monitor an MP3 player, or is it an explosive device? Is that shadow on the X-ray harmless scar tissue, or is it a life-threatening tumor just beginning to grow? Is that smell the usual musty odor coming from the utility room, or is there a gas leak in the water heater? Knowing that thresholds can have profound life-or-death implications, researchers have devised sophisticated mathematical formulas to understand how we detect these faint signals. **Signal detection theory** predicts how and when we detect the presence of a faint stimulus (signal) amid background stimulation (noise). Signal detection depends on the stimulus, the environment, and the person doing the detecting. It grew out of the Cold War in the 1950s and 1960s as a way of improving our ability to detect incoming nuclear warheads in time to respond appropriately. The idea was for the person monitoring the radar to score "hits"—to recognize missiles on a radar screen for what they were and, equally important, to avoid mistakes. These mistakes were either "false alarms," where the missile later turned out to be a commercial aircraft or a flock of birds, or "misses," where the observer failed to detect a real missile blip on the screen, perhaps through exhaustion or distraction. National security depends on accurate signal detection.

Signal detection formulas consider three kinds of variables:

- *Stimulus variables*—How bright is the blip on the radar screen?
- *Environmental variables*—How much distracting noise is there in the room with the radar equipment?
- *Organismic variables*—Is the operator properly trained and motivated?

Signal detection theory is now used in a variety of nonmilitary applications, ranging from understanding how physicians can more accurately detect tumors in time for successful treatment to improving air traffic controllers' ability to track aircraft and identify planes flying dangerously close to one another. Airport security personnel are periodically tested on their ability to detect significant stimuli by the addition of images of guns and knives to luggage X-rays. The system congratulates the screener when the dangerous images are successfully detected (Winerman, 2006).

Signal Detection Theory

Signal detection theory helps us understand how quickly we can notice and correctly interpret a blip on a radar screen. The researcher would consider the nature of the screen itself (How bright are the blips?), the surrounding environment (How much "noise" or distraction is there?), and the person doing the detecting (Is he trained, motivated, healthy, and alert?).

MR. JAMES BRABENEC (IMCOM)/THE UNITED STATES ARMY

What happens when you detect a stimulus continuously? That brings us to sensory adaptation.

Sensory Adaptation

Living organisms must constantly adapt to meet the demands of their environment. This means we pay more attention to new stimuli, which are most likely to be significant. If nothing has changed in your visual field, you are probably OK. But if you sense movement off to one side, you'd best pay attention. That moving object could be an out-of-control car or something falling off a shelf; in either case, you're at risk.

Our adaptive nature means we filter out the nonchanging aspects of our environments, a process known as **sensory adaptation.** When stimulation is constant and unchanging, you eventually fail to respond because you usually don't need to. One example of sensory adaptation occurs when you dive into a swimming pool filled with cold water. At first, the water seems frigid, but if you stay in for a while you'll eventually "get used to it." In other words, you'll adapt to the constant stimulation of the cold water. You can also adapt to hot water, of course, or an odor, or the feel of an article of clothing, or a constant noise like the hum from an air conditioner. I even adapted once to the feel and sight of my eyeglasses. I had been wearing them so long that, in a sense, they "disappeared." I spent several minutes looking for them before my wife started laughing and pointed out they were right on my face where they usually are.

JOHN BERRY/THE IMAGE WORKS

Sensory Adaptation: What Smell?

Inside the bucket is raw garbage that is to be fed to earthworms as part of a recycling demonstration. Notice that the young visitors have not yet adapted to the smell of garbage and so are holding their noses against the stench. The recyclers, on the other hand, have adapted to the smell and have probably filtered it out completely.

Selective Attention

Hundreds of millions of stimuli are competing for your attention right now. Every page of this textbook is a stimulus, as is every paragraph, sentence, word, syllable, letter, and part of a letter. Every sound within your hearing range is a stimulus, as is every taste in your mouth. (Is a hint of the flavor from your last meal still there?) Because you live in such a sensory-rich environment, you must select certain stimuli to attend to and ignore the rest. Focusing conscious awareness on a particular stimulus to the exclusion of others is **selective attention.**

A good example of selective attention can be seen in E. G. Boring's famous old woman–young woman drawing (see **Figure 6.2**). You can look at the drawing and see the old woman, *or* you can see the young woman. With practice, you can switch back and

Figure 6.2
Selective Attention: What Do You See?

You can perceive this famous drawing in one of two ways: as an old woman (with thin lips, a big nose, and her chin tucked down against her chest) or as a young woman (looking back over her right shoulder and wearing a black necklace, with her jawline and left ear clearly visible). You can attend to one or the other, and even learn to switch back and forth quickly, but you can't see both at once.

forth quickly, but you can focus your attention on only one of these faces at a time.

Selective attention to a small number of stimuli lets you function in a busy, noisy world. Right now, you are effectively blocking out a variety of stimuli in your environment—the feel of the clothes you are wearing, the temperature of the air around you, the noises outside the room you are in, and so on. It is why you can focus on a movie while others are talking in the theater. Perhaps you have had the experience of being so caught up in a book or a conversation that you missed somebody walking into the room or saying something to you. Perhaps you can also identify times when you were trying to study and were too easily distracted by stimuli in your environment. Selective attention (or lack of it) plays an important role in our lives.

PAUSE NOW OR MOVE ON

Turn to page 115 to review and apply what you've learned.

The Visual System

If you asked several of your friends which of the basic senses they'd least like to lose, chances are the most common answer would be vision. Just the thought of losing this fundamental connection to the world is enough to help us appreciate the wonder of our ability to see. In this section, you will see how it all works.

The Nature of Light

WHAT'S THE POINT?

6-2 What is light, and what is the nature of light waves?

No light? No sight! Even nocturnal creatures depend on the low level of light available to their eyes at night. Light enters the eye as waves of *electromagnetic energy* (see **Figure 6.3**). The visible spectrum is the tiny part of the electromagnetic spectrum that produces the light (and colors) humans can see. Electromagnetic energy ranges all the way from gamma waves, with very short wavelength, to long-wave radio waves.

Two characteristics of electromagnetic light waves determine what we see in the visual spectrum. The length of the light wave determines the light's color, or *hue* (see **Figure 6.4a, b**). Have you ever learned the memory trick "ROY G BIV" for remembering the colors of the rainbow in order (red, orange, yellow, green, blue, indigo, and violet)? These colors are produced as the wavelength of light shortens—red light, with a distance between peaks

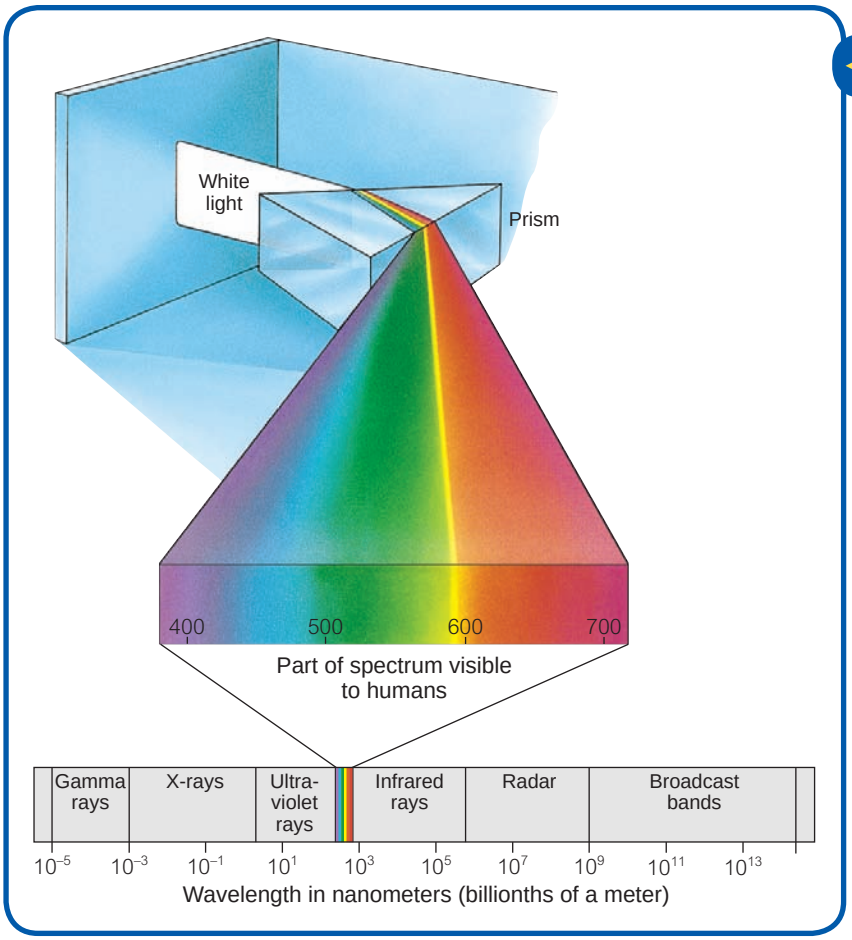


Figure 6.3
Light and the Electromagnetic Spectrum

Light is a form of electromagnetic energy. This energy travels in waves, ranging from short gamma rays to long radio waves. The human eye can detect only a small portion of these waves, the visible spectrum, as light.

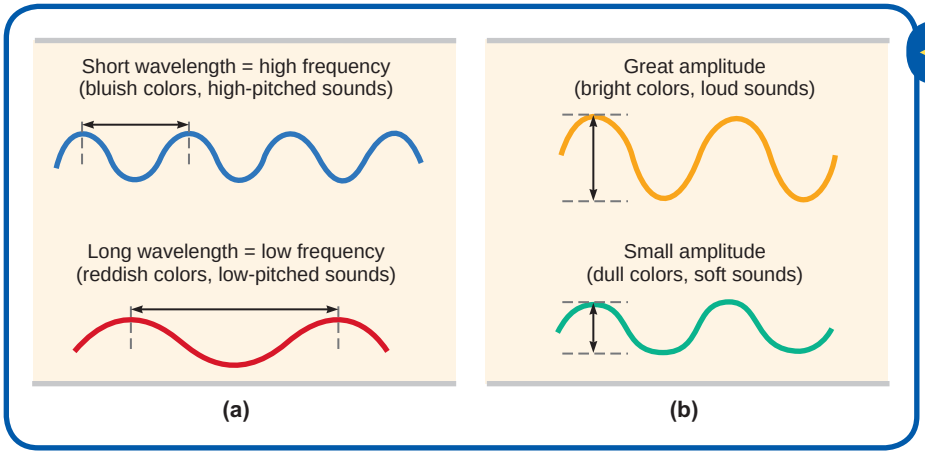


Figure 6.4
The Physics of Waves

(a) One dimension of waves is wavelength, the distance from peak to peak. The shorter the wavelength, the more peaks reach you in a unit of time (frequency). For light waves, the length of the wave determines hue, or color. For sound waves, the length of the wave determines pitch. (b) The other dimension of waves is amplitude, the height of a wave. Amplitude determines brightness for light waves and loudness for sound waves.

of about 700 billionths of a meter, has almost twice the wavelength of violet light, with a distance of about 400 billionths of a meter.

The second characteristic of waves—the *amplitude,* or height, of the wave—determines brightness (see Figure 6.4b). Taller waves of the same wavelength produce brighter levels of the same color.

PAUSE NOW OR MOVE ON

Turn to page 116 to review and apply what you've learned.

cornea The clear, curved bulge on the front of the eye that bends light rays to begin focusing them.

iris A ring of muscle tissue that forms the colored portion of the eye and regulates the size of the pupil.

pupil The adjustable opening in the center of the iris, which controls the amount of light entering the eye.

lens A transparent structure behind the pupil in the eye that changes shape to focus images on the retina.

● Do you believe in the "evil eye"? X-ray vision? Perhaps because of these popular ideas, roughly half of American adults believe that vision—even normal, everyday vision—involves energy being sent out from the eye rather than being received by it (Winer et al., 2002). After reading this section, we hope you will clearly see this notion as another myth disproved by psychological science.

The Structure of the Visual System

WHAT'S THE POINT?

6-3 How do the structures and receptor cells in the eye work together to detect light waves and change them into neural impulses?

Let's trace the path of a single light ray as it enters the eye. As we take our little trip along the visual pathway, follow along on **Figure 6.5.** The light first strikes the **cornea,** the clear, curved bulge on the front of the eye that bends light rays to begin focusing them. You can see the cornea move under the eyelid when someone looks back and forth with eyes closed. The cornea also protects the eye because it is rich in nerve endings, which you know if you've ever had the misfortune of scratching it.

Because the cornea is clear, we can see a disk of colored tissue behind it, the part of the eye we're describing when we talk about the color of someone's eyes. This is the **iris,** a ring of muscle tissue that forms the colored portion of the eye and regulates the size of the pupil. The adjustable black opening in the center of the iris is the **pupil,** which controls the amount of light that enters the eye. The pupil appears to be black because no light is emitted *from* the eye. It's similar to looking at the opening of a dark cave.

The iris and pupil work together to regulate the amount of light that enters the eye. When exposed to bright light, the iris expands inward, making the pupil smaller and letting less light enter the eye. When exposed to dim light, the iris draws back and the pupil enlarges to admit more light. You can actually watch this process if you wake up in the night and stumble your way to the bathroom mirror. Turn on the light, and you will see the pupil shrink before (and within!) your eyes. It is rapidly working to restrict the incoming light that you find too bright.

Continuing our journey along the visual pathway, we next encounter the **lens,** a transparent structure behind the pupil that changes shape to focus images on the retina. Some of us have lenses that do not focus the light

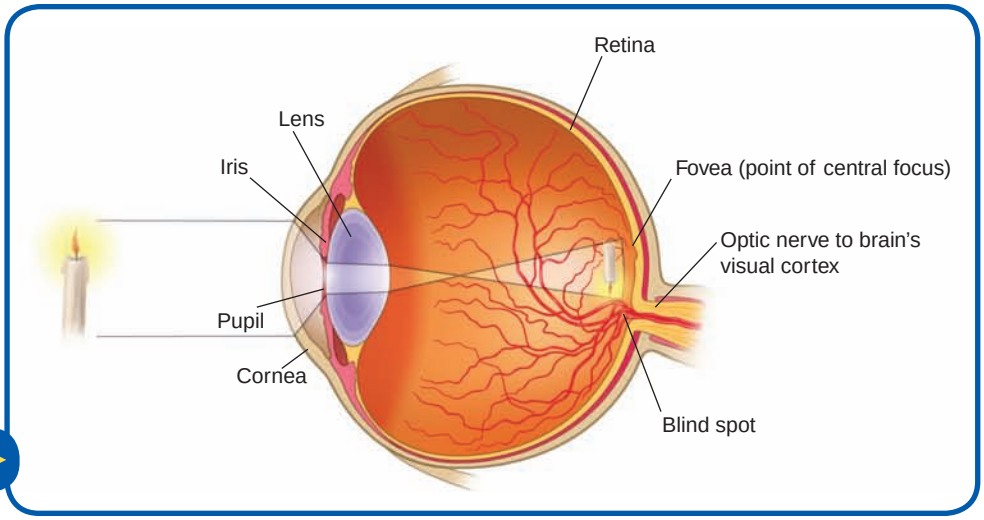


Figure 6.5
The Eye

When you view an object, light rays travel through the cornea, the pupil, and the lens at the front of the eye. These structures work together to focus the image on the retina at the back of the eye. The retinal image is upside down and reversed, but your brain, of course, makes sure that you perceive the world in its correct orientation.

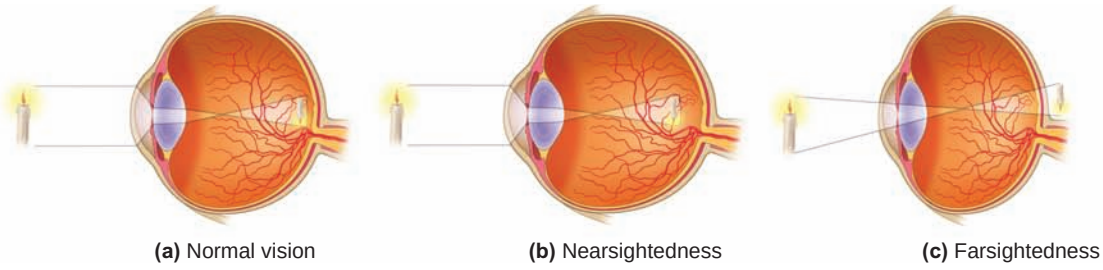
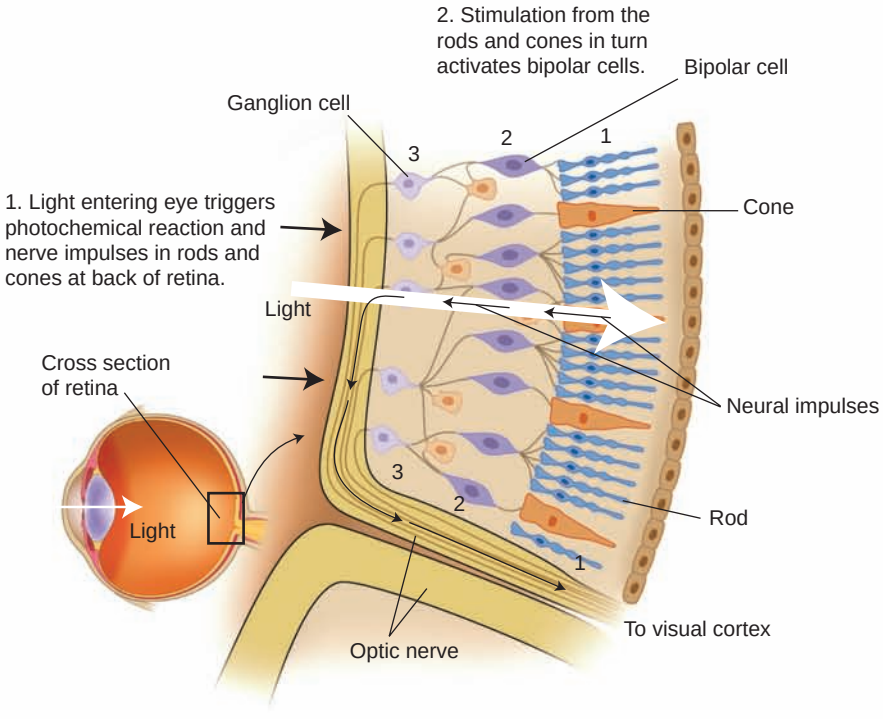


Figure 6.6
Nearsightedness and Farsightedness

(a) With normal vision, the lens focuses the light rays into an image on the retina. The result is a clear, focused image. (b) In a nearsighted person's eye, the lens causes light rays from distant objects to converge in front of the retina, which blurs the image. (c) If a person is farsighted, the lens causes light rays from close objects to converge behind the retina. Corrective lenses, either in eyeglasses or as contact lenses, help the eye's own lens focus the image correctly on the retina. Laser eye surgery accomplishes the same goal by carefully reshaping the cornea so that it sharply focuses the image.

effectively; as a result, we are nearsighted or farsighted (see **Figure 6.6a, b, c**). Luckily, help is available in the form of glasses, contact lenses, or laser surgeries that actually reshape the surface of the cornea. These wonderful inventions "correct" our vision (I, for one, would be lost without them) by helping the lens effectively focus light reflected from the objects we are viewing.

Until this point in our journey, the structures in the eye have been moving visual information to the **retina,** the light-sensitive surface at the back of the eyeball. The surface of the retina, like the pixel array in a camera, is sensitive to light. The retina is made up of three layers of special and interesting cells (see **Figure 6.7**). The deepest layer is composed of **receptor cells,** which have the ability to change light energy into nerve impulses that the brain can interpret. Every sensory system has receptor cells that convert various forms of energy into such impulses; without these cells, the brain would be completely isolated from information in the outside world.



3. Bipolar cells then activate the ganglion cells, the axons of which converge to form the optic nerve. This nerve transmits information to the visual cortex in the brain's occipital lobe.

Figure 6.7
The Retina

Light rays filter to the innermost layer of the retina before the rods and cones convert the visual information to neural impulses. The information then travels through the retina's middle layer (made of bipolar cells) and outer layer (made of ganglion cells). The long axon fibers from the ganglion cells come together to form the optic nerve, which exits the eye at the blind spot and carries the information to the brain for further processing.

retina The light-sensitive surface at the back of the eyeball.

receptor cells Specialized cells in every sensory system of the body that can turn other kinds of energy into action potentials (neural impulses) that the brain can process.

rods Visual receptor cells located in the retina that can detect only black, white, and gray.

cones Visual receptor cells located in the retina that can detect sharp details and color.

optic nerve The nerve that carries visual information from the eye to the occipital lobes of the brain.

blind spot The point at which the optic nerve travels through the retina to exit the eye; the lack of rods and cones at this point creates a small blind spot.

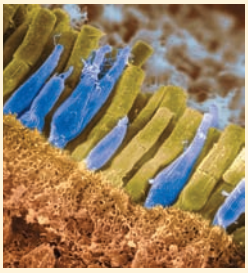
Your visual system has two different types of receptor cells, rods and cones, to change light energy into nerve impulses that the brain can interpret (see Table 6.1). **Rods** can detect only black, white, and shades of gray. Also, rods have a lower absolute threshold than cones do. So, under dim light conditions, only rods respond and you see the world in shades of gray. The less numerous **cones** detect sharp details and colors, but color becomes apparent only if there is enough light. The detail-oriented cones cluster at the center of the retina; this spot, known as the *fovea,* is the area where your vision is best.

The rods and cones feed their information into the middle layer of retinal cells, the *bipolar cells.* The bipolar cells in turn pass that information to the *ganglion cells,* which form the final layer in the retina. The axons of the ganglion cells come together to form the **optic nerve,** which carries information from your eyes to your brain's occipital lobes, where extensive visual processing occurs. We tend to think that we see with our eyes, but it is our brains that must process the information that the eyes deliver. Where the optic nerve exits the eye, it creates a **blind spot** because no rods or cones can occupy that point on the retina. Figure 6.8 will help you identify your own blind spot.

Table 6.1

Receptors in the Human Eye: Rod-Shaped Rods and Cone-Shaped Cones

	Rods	Cones
Number	6 million	120 million
Location in retina	Center	Periphery
Sensitivity in dim light	Low	High
Color sensitivity	High	Low
Detail sensitivity	High	Low



OMIKRON/PHOTO RESEARCHERS, INC.

Figure 6.8
A Blind Spot Detector

A blind spot exists where the optic nerve exits through the retina, because there are no rods or cones at this point. To find your blind spot, close your right eye and look at the boy. Maintain your focus on the boy and slowly adjust the distance of the book from your eyes until the cookie disappears. Under normal circumstances, you are unaware of your blind spot because one eye sees what the other does not. Even with one eye closed, you're not aware of the gap because your brain "fills in" the missing information by making an assumption about what belongs in the void. This assumption is another example of top-down processing.

PAUSE NOW OR MOVE ON

Turn to page 116 to review and apply what you've learned.

Color Vision

trichromatic theory A theory of color vision that says cones are sensitive to red, green, or blue light—the three colors that combine to create millions of color combinations.

WHAT'S THE POINT?

6-4 How do the trichromatic theory and opponent-process theory contribute to our understanding of color vision?

Difference thresholds are child's play to the eye. Our visual system is so good at detecting minor variations in color that we can detect *7 million* separate hues (Geldard, 1972). The richness this ability adds to our visual world is apparent in the array of color chips available at the paint store and the variety of lipstick colors at the cosmetics counter.

Color, as we know, is a function of the cones. According to a theory first proposed in the nineteenth century and based on the work of Hermann von Helmholtz and Thomas Young, cones are sensitive to three wavelengths of light, which represent red, green, and blue. According to this **trichromatic (three-color) theory,** these three colors combine to create millions of color combinations. The trichromatic system is similar to the design used to enable color on TV screens and computer monitors. These screens produce different intensities of red, green, and blue, and all the colors you see on the screen are mixtures of these three basic colors. The cones in the retina operate the same way.

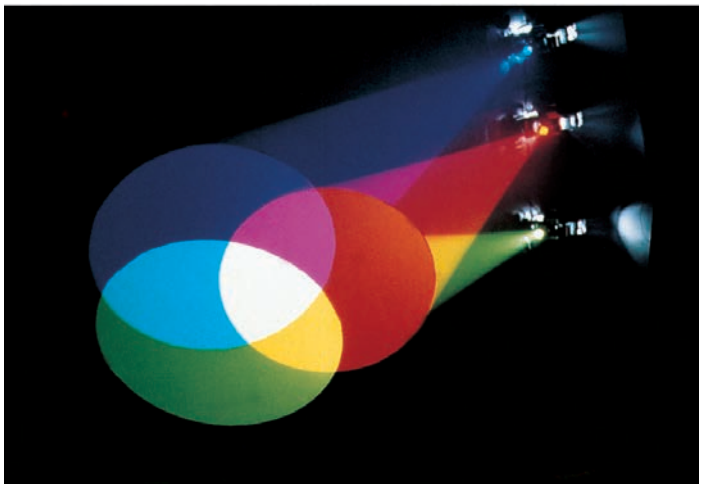
If you've studied art, you may have learned that the primary colors are red, blue, and yellow, and wonder why cones aren't "tuned" to these three colors. You'll find the answer in **Figure 6.9a, b.** Painting produces color by a *subtractive* process: Each paint pigment subtracts—absorbs or "soaks up"—different wavelengths of light. Red paint, for example, absorbs all wavelengths except red, which is reflected back to the eye. If you mix red, blue, and yellow paint together, you end up with black; together, those three pigments subtract all wavelengths of light.

Figure 6.9
What Are the Primary Colors?

That depends on whether you're mixing paints or lights. Mixing paints is a subtractive process—each new pigment "soaks up" another wavelength of reflected light. All wavelengths are subtracted with a mixture of red, blue, and yellow (the result is black), so they are primary. Mixing colored lights is an additive process—each new color adds another wavelength. In this case, the fewest colors that can be mixed to produce white light (representing all wavelengths) are red, green, and blue, so they are primary for this additive process.

Subtractive color mixing

Additive color mixing



FRITZ GORO, LIFE MAGAZINE ©1971 TIME WARNER, INC./GETTY IMAGES

Stop on Red, Go on Blue?

Isn't it interesting that traffic lights use red and green—the two colors most likely to be confused by a person with color vision deficiencies—as the means of conveying the important information of whether to stop or proceed? If you check, you'll notice that newer traffic signals now have a lot of blue in the "green" light; now it's more of a teal light. This slight change helps people with color-deficient vision tell the difference between stop and go. It also helps, of course, that red and green occupy different positions in the box that houses the lights.

LUIS SANTOS

Vision, however, operates on an *additive* process, with each wavelength of light adding a new color to the mix. If you mix red, green, and blue lights, you end up with white, not black. Those three lights are primary because they produce white light, which combines all wavelengths.

"Color-blind" people generally lack one of the three types of cones. A more accurate term is *color deficient* because people with this condition are not blind to color but are just limited in the number of colors they can see. Usually they lack either the red cones or the green cones and have trouble telling the difference between the two (Boynton, 1979). This inherited condition is more common among males than females. Many times, the person with the color deficiency does not even realize a problem exists.

There are some things trichromatic theory does not explain. One of the most fascinating is why we see color afterimages. If you have normal vision, try this for yourself with **Figure 6.10** by turning the odd green, black, and yellow American flag into the more familiar red, white, and blue version of the stars and stripes. Ewald Hering proposed an **opponent-process theory** of color to explain such images. Hering's theory argues that color is processed in opponent pairs (red-green, yellow-blue, and black-white). Light that stimulates one half of the pair inhibits or blocks the other half. For example, stimulation that turns *on* a green-processing neuron ensures that a red-processing neuron will be *off* (DeValois & DeValois, 1975). Thus, you can see red *or* green at any one spot at a given time but not both simultaneously. Many color pairs combine easily (red and blue, for example, combine to form violet), but there is no "greenish-red" color.

opponent-process theory A theory of color vision that says color is processed by cones organized in opponent pairs (red-green, yellow-blue, and black-white); light that stimulates one half of the pair inhibits the other half.

When you stared at the flag in Figure 6.10, you did so long enough to fatigue your green-detection neurons. Then, when you looked at the white space, your red-detection neurons, which were not tired, produced a red aftereffect that lasted until the green cells recovered.

So, we have two entirely different theories of color vision: the Young-Helmholtz trichromatic theory and the Hering opponent-process theory.

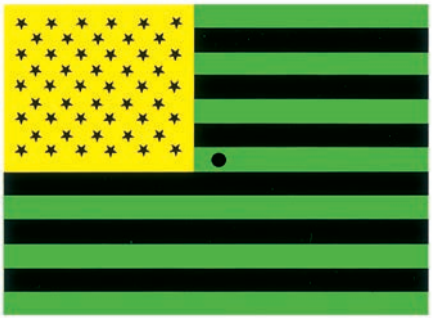


Figure 6.10
Color Afterimages

Look at the center dot of the flag for about a minute, then shift your gaze to the dot beside it. An afterimage will develop, but it will be in red, white, and blue. The opponent-process theory of color vision can explain this, but the trichromatic theory cannot.

Which one is right? *Both* are. Substantial experimental evidence indicates that both systems function to let you see color, and we have no reason to suspect that the existence of one makes the other impossible. Color is clearly important to us.

pitch A sound's highness or lowness, which depends on the frequency of the sound wave.

PAUSE NOW OR MOVE ON

Turn to page 116 to review and apply what you've learned.

Hearing

WHAT'S THE POINT?

6-5 What are the structures of the ear? How do they work to detect sound waves and change them into neural impulses?

Silence may be golden, but sound enriches our experience of the world. In this section, we explore what sound is and how we process it into a form we can understand.

The Nature of Sound

Light enters the eye as waves of electromagnetic energy. Sound comes in waves, too (see Figure 6.4), but in this case the waves are produced by vibration. Sound *is* vibration. You can feel your vocal cords vibrate if you touch your neck while singing or talking. Musical instruments all produce vibrations—of strings in the case of guitars and pianos, of reeds in the case of saxophones, of drumskins in the case of tympani. But you won't hear any of these sounds unless the vibration is carried from its source to your ear. Typically, the vibration travels in pulses of air molecules. But other substances can carry sound waves, too, such as the bones of our skull transmitting the sound of a fast-beating heart to our ears or the water in a pool transmitting the sound of music to the ears of synchronized swimmers. In the case of light, the length of the wave produced hue, and the amplitude (height) of the wave produced brightness. For sound, the length of the wave (frequency) determines **pitch,** the sound's highness or lowness. Pitch is expressed as *hertz (Hz)*—the number of sound waves that reach the ear per second. Hertz represent the frequency of a sound wave and determine the pitch of a sound. Middle C on the piano, for instance, represents a sound of 256 Hz. Normal human hearing allows us to hear deep, rumbling bass sounds as low as 20 Hz or high-pitched whistles of 20,000 Hz, although as you get older you gradually lose your

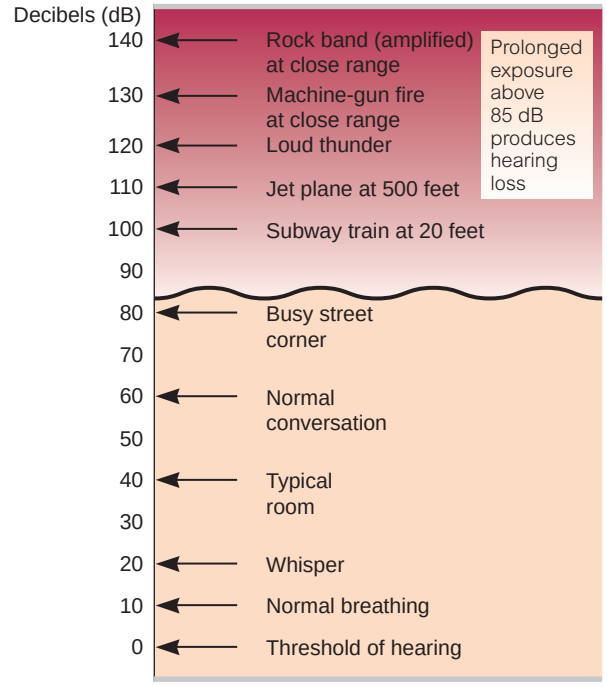
Sound Enriches Our World

Sound can annoy—think of fingernails on a chalkboard. But it can also elate. This girl is clearly lost in a world of music.

PROXYMINDER/ISTOCKPHOTO

Figure 6.11
How Loud Is Loud?

The loudness of sound is measured in decibel (dB) units. Every 10 dB increase represents a *tenfold* increase in loudness (a 20 dB increase is 100 times louder, and a 30 dB increase is 1,000 times louder). Prolonged exposure to sounds of 85 dB or more can cause hearing loss.



ability to hear higher-pitched sounds. This is why the so-called mosquito or teen buzz ringtone (you can find examples on the Internet if you have not listened to it) can be heard by most teenagers but not by most adults. This sound is a little above 17,000 Hz.

The height, or amplitude, of the sound wave determines *loudness,* which is usually measured in *decibels (dB),* named after Alexander Graham Bell. The absolute threshold for hearing is 0 dB. You can see the decibel level of some common sounds in **Figure 6.11.** Notice that any prolonged sound exceeding 85 dB can produce hearing loss. Sound at the 85 dB level is not painful, and many people play music through headphones at volume levels above 85 dB. This is not a good idea. The hearing loss will not be noticeable on a day-to-day basis, but exposure to any loud, prolonged noise (including good music!) will produce gradual, irreversible hearing loss. Many aging rockers from the 1960s—including Pete Townsend of The Who and Stephen Stills of Crosby, Stills, Nash, and Young—are now dealing with hearing loss caused by exposure to loud amps at countless concerts. Listen up, music fans, and turn down the volume.

The Structure of the Auditory System

When your best friend shouts your name across the food court at the mall, what happens? First, the vocal cord vibrations that constitute the sound must travel through the air from your friend's mouth to your ear. When the sound waves reach your ear, they travel down your *auditory canal,* the opening through which sound waves travel as they move into the ear for processing (see **Figure 6.12**). At the end of the auditory canal, the sound waves reach a

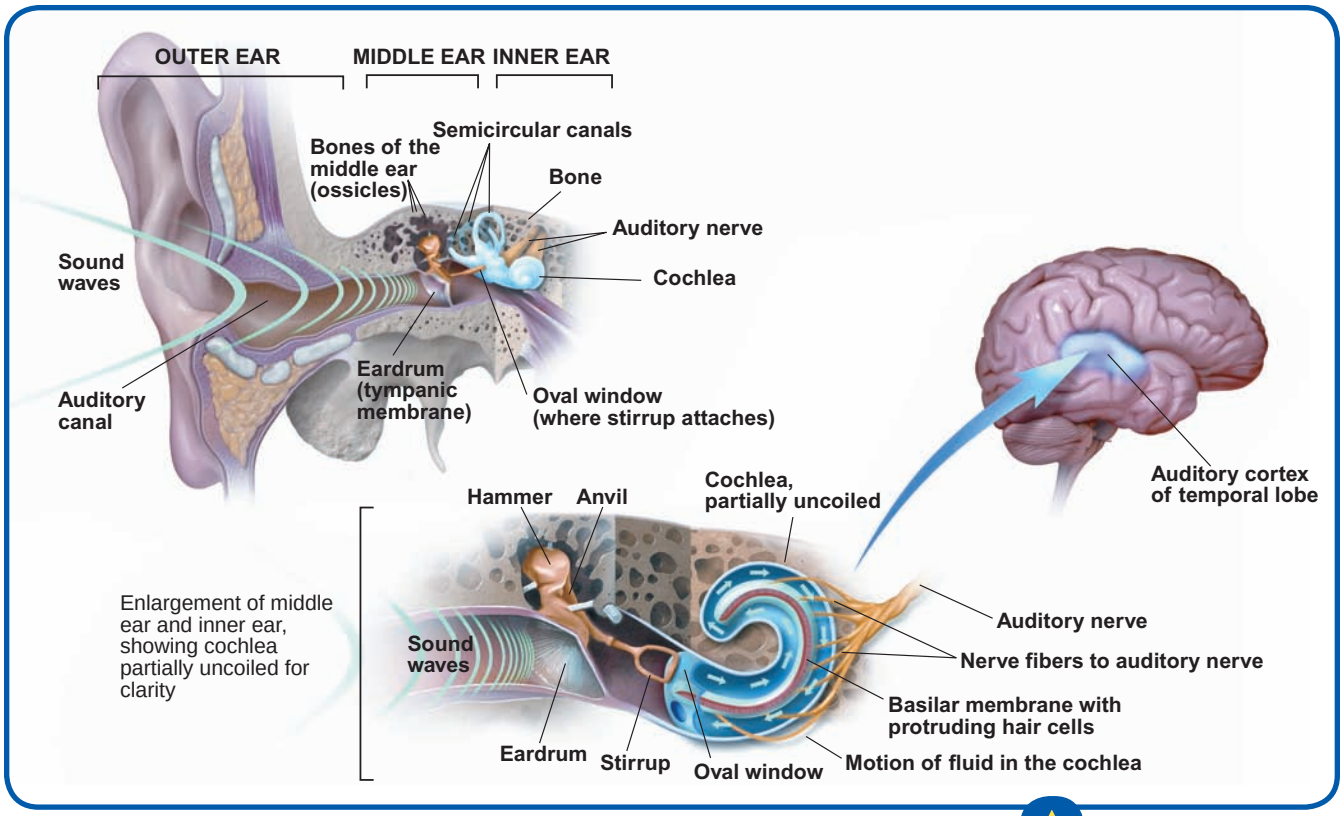


Figure 6.12
The Amazing Journey of a Sound

Sound waves must travel through air, tissue, bone, and fluid before the receptor cells for hearing, the hair cells in the cochlea, generate nerve impulses that the brain can interpret. Use this diagram to follow the path of sound as you read about its journey in the text.

piece of tissue that seals the inner workings of the ear from the dirt, Q-tips, and small Lego pieces of the outside world. This tissue is called the *eardrum* (more formally known as the *tympanic membrane*). The eardrum transfers sound vibration from the air (your friend shouting your name) to the three tiny bones of the middle ear. The tissue of the eardrum is quite tough, but it can be damaged, either by direct contact with objects inserted in the ear (this is why you shouldn't insert objects in your ear) or by exceptionally loud noises that can literally cause the eardrum to burst. When the eardrum heals, some hearing loss will remain because the scar tissue that develops does not conduct vibration as readily as the original tissue.

Attached to the back of the eardrum is the *ossicles,* a tiny mechanism consisting of three small bones that transfer sound waves from the eardrum to the cochlea. These bones are called the *hammer,* the *anvil,* and the *stirrup* because (if you use your imagination) they vaguely resemble these objects. The main organ of hearing is the **cochlea,** a fluid-filled, snail-shaped bony tube in the inner ear where sound waves are changed to neural impulses. *Cochlea* is the Latin term for "snail."

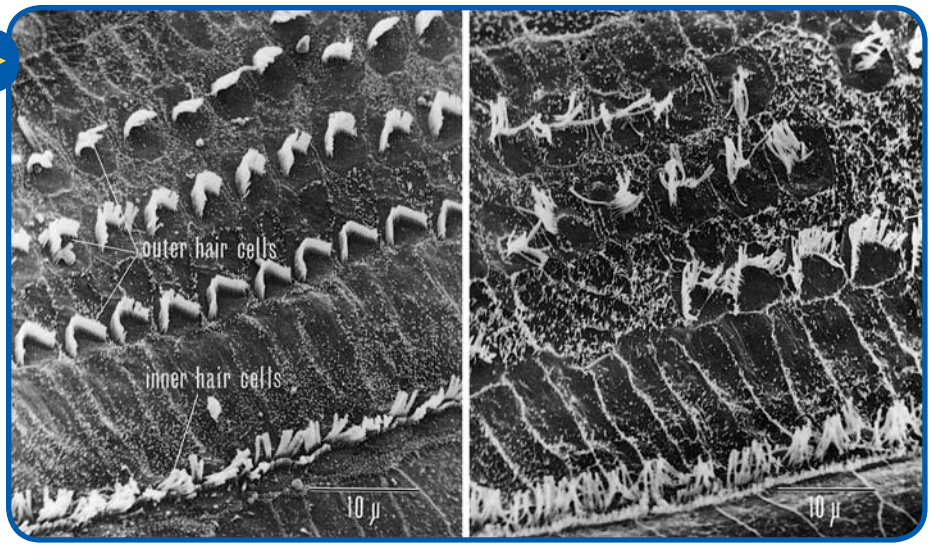
The point on the surface of the cochlea that receives sound vibrations from the ossicles is the *oval window.* The oval window begins to vibrate at the same frequency as an incoming sound. This, in turn, sets up vibrations in the fluid that fills the cochlea. Finally, the vibrating fluid stimulates thousands of **hair cells,** tiny projections in the cochlea that are the receptor cells for hearing. When vibration causes the tips of these hair cells to move even the width of an atom, the vibrations cause the hair cells to generate neural impulses that your brain can process (Corey et al., 2004). But prolonged

cochlea [KOHK-lee-uh] The major organ of hearing; a snail-shaped, bony, fluid-filled structure in the inner ear where sound waves are changed to neural impulses.

hair cells The receptor cells for hearing; these are located in the cochlea and are responsible for changing sound vibrations into neural impulses.

Figure 6.13
Warning: Rock Concerts Can Be Dangerous to Your Guinea Pig (and You)

These scanning electron micrographs of the inner ear hair cells of a guinea pig (a) before and (b) after exposure to 24 hours of loud noise (comparable to that of a loud rock concert) testify to noise's destructive effects.



ROBERT PRESTON & JOSEPH E. HAWKINS, KRESGE HEARING RESEARCH INSTITUTE, UNIVERSITY OF MICHIGAN

auditory nerve The nerve that carries sound information from the ears to the temporal lobes of the brain.

exposure to loud noise will damage these vitally important cells. The two photos in **Figure 6.13a, b** show hair cells before and after such damage.

The neural impulses are collected by fibers that attach to the base of each hair cell. These fibers join to form the **auditory nerve,** which exits the cochlea and carries sound information to the temporal lobes of the brain, where auditory processing occurs.

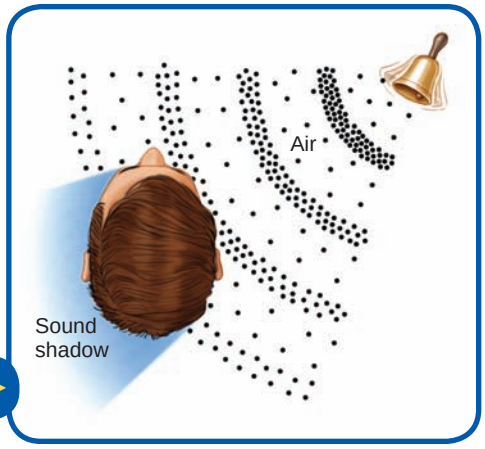
Sound Localization

If you are a hearing person, close your eyes for a moment and listen to the sounds around you. Do you have any difficulty knowing where a particular sound is coming from—whether it's behind you or in front, to your left or to your right? Localizing sounds is something we are good at, and it's important that we are. Sounds often signify important environmental events, including the presence of danger. We'd *better* be able to locate the source quickly. How do we do it?

We rely on two important cues to locate sound sources (see **Figure 6.14**). Step one is to determine which ear hears the sound first. Sound traveling through air moves about 750 miles per hour. That's fast, but there is still a detectable

Figure 6.14
How Do You Know Where a Sound Is Coming From?

When a sound originates from your right, as in this figure, it reaches your right ear slightly faster and slightly louder than it reaches your left ear. Your brain calculates the differences to locate the source of the sound. Sometimes it is difficult to tell if a sound is coming from directly ahead of you or directly behind you because sounds in this plane reach both ears at the same time and with equal intensity.



time lag before sound reaches the farther ear (Brown & Deffenbacher, 1979; Middlebrooks & Green, 1991). In step two, we determine which ear hears the louder, more intense sound. By the time a sound moves around to the ear farther from the source, the sound is muted enough for your brain to be aware of the difference. Locating the source of sounds is only one of many determinations your brain makes without any conscious effort on your part.

PAUSE NOW OR MOVE ON

Turn to page 117 to review and apply what you've learned.

Other Senses

WHAT'S THE POINT?

6-6 How are tastes, smells, and touch sensations processed?

We have spent considerable time on vision and hearing, which no doubt are vital senses. They also are the best-understood sensory systems and the ones that first come to mind when the topic of sensation comes up. But think about what life would be like with no ability to taste or smell. Without the ability to savor the taste and smell of food, would you still be willing to put effort into preparing meals and eating them? And what would life be like with no sense of touch? You would lose not only "good touch," like the satisfaction of a hug or kiss from someone you care about deeply, but also the ability to detect pain. This loss may sound like an improvement, but it wouldn't be. Pain is one of the most effective mechanisms we have to protect ourselves from environmental dangers. Without pain, we wouldn't realize that we had placed our hand on a red-hot stove burner until we smelled our flesh burning—far too late to minimize the seriousness of the injury. Finally, what about your sense of balance and your ability to judge the position of your body parts? Walking would be incredibly difficult if you didn't have a sense of what your legs were doing at each step (excuse the pun) of the process.

Let's take a brief look at some of our remaining senses.

Taste

Taste is a chemical sense. You have receptor cells located on the surface of the tongue (and, to a lesser degree, elsewhere in the mouth) that respond to the chemical structure of the foods you eat. These receptor cells can detect five tastes. We have known about salty, sweet, sour, and bitter for a long time (McBurney & Gent, 1979). Most recently, researchers discovered a fifth taste receptor for the savory, meaty taste called *umami* (Smith & Margolskee, 2001).

Flavor, a Sensory Interaction

We often speak of taste when we really mean flavor. Taste can detect only sweet, sour, salty, bitter, and umami. The flavors shown here on these sumptuous plates also involve their smell, texture, temperature, and appearance.

Newborn babies have a natural attraction to salty and sweet tastes, a biological predisposition that ensures that they will seek mother's milk (which is sweet) and salt (which is necessary for survival). Babies also have natural dislikes—of sour and bitter tastes—which protect them from substances that are more likely to be poisonous.

Taste receptor cells can be damaged by heat, as you no doubt know if you've ever burned your mouth on hot food you couldn't wait to eat. Tobacco smoke also harms these cells. Fortunately, taste cells do replace themselves within a few days. An added benefit of kicking the cigarette habit is that food starts to taste better as the taste cells regenerate.

One interesting fact about taste is that we don't all have the same sensitivity to taste. About a quarter of the population, dubbed "supertasters" by researcher **Linda Bartoshuk** and her colleagues (1994), have an abundance of taste receptors that allow them to experience tastes, especially bitter tastes, more intensely than most of us do. Bartoshuk theorizes that these individuals were the poison detectors of ancient civilization. If they avoided a food, it was likely to be dangerous and others would avoid it as well. Even today, supertasters, with their enhanced sensitivity to alcohol's bitter taste, are less likely to become dependent on alcohol than are those who don't share this trait.

Another quarter of the population are nontasters. They do taste, of course, but with much less intensity than people with more taste cells. These individuals tend to do well in times of food scarcity because they are willing to eat anything, no matter how bad it tastes. In times of plenty this tendency can be dangerous, but it just might allow survival in famine. Most of us, about half the population, fall in the middle as medium tasters.

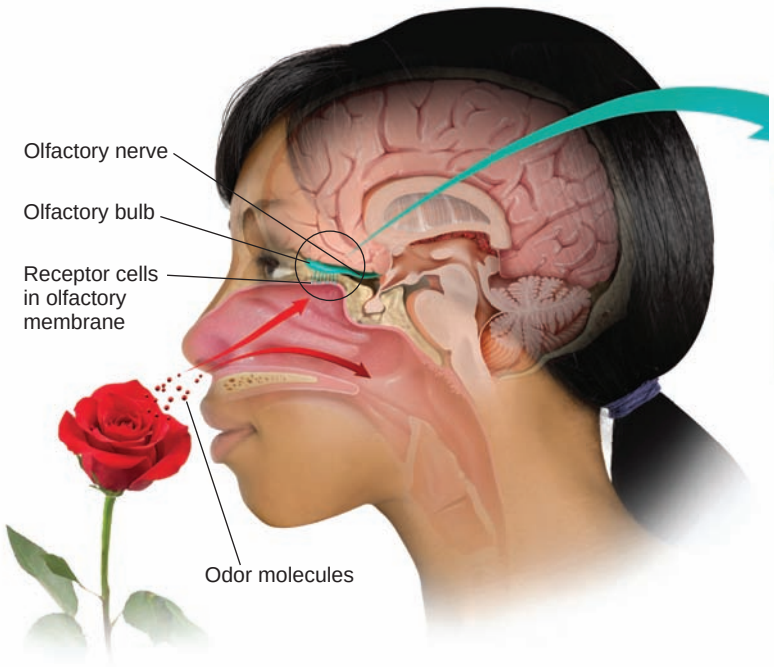
COURTESY UNIVERSITY OF FLORIDA HEALTH

LINDA BARTOSHUK (1938–) Renowned researcher on the role of genetics and the treatment of disorders in the chemical senses of taste and smell.

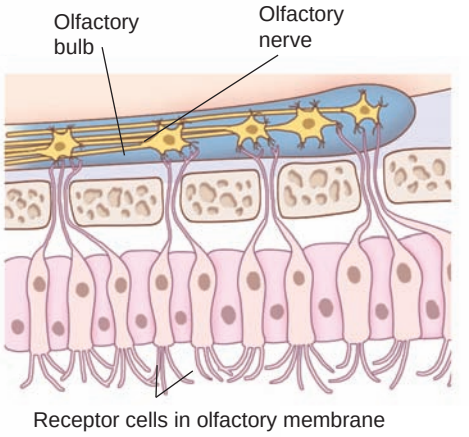
Smell

Smell, like taste, is a chemical sense. Molecules given off by many substances circulate in the air (see **Figure 6.15**). When these molecules reach the upper nasal passages, *olfactory cells* that project from the brain can process these smells. In some ways, smell is more complicated than taste. By triggering various combinations of olfactory cells, thousands of odors are detectable.

Taste and smell interact to produce flavor. Perhaps you've noticed that flavor is greatly diminished when you have a head cold with lots of congestion. Odors that normally travel up to the nasal passages from the back of the throat are blocked when you have a head cold, and you are left with taste alone. Try plugging your nose the next time you eat a fruit-flavored jelly bean or Starburst candy. You can detect sour (from the citrus) and sweet (from the sugar), but you cannot tell the flavor (cherry, lemon, and so on). As soon as you unplug your nose, however, the flavor becomes



1. To smell a rose, airborne molecules of its fragrance must reach receptors at the top of the nose. Sniffing swirls air up to the receptors, enhancing the aroma.



2. Millions of receptor cells at the top of each nasal cavity send messages through axon fibers that form the olfactory nerve and route those messages to the olfactory bulb at the forward base of the brain. From here information is sent to the primary smell cortex located in the temporal lobe, as well as to various lower brain regions, especially parts of the limbic system involved in memory and emotion.

Figure 6.15
The Sense of Smell

We are sometimes advised to "stop and smell the roses." This is not as easy as it seems!

instantly apparent! Actually, flavor is an interaction of more than just taste and smell. Appearance is important (how much appeal would blue milk have?), which is why fine restaurants spend so much effort on the visual presentation of their food. Feel or texture is also important (imagine soggy potato chips!), as is temperature (how does a steaming-hot cup of Coca-Cola sound?).

Touch

Touch is your physical connection with the outside world. Your skin is embedded with receptors that respond to various kinds of stimulation. The basic skin senses are pain, warmth, cold, and pressure. Your experience of other skin sensations flows from various combinations of these four basic skin senses. An itch, for example, results from gentle stimulation of pain receptors, hot from simultaneous stimulation of warm and cold (see **Figure 6.16**), and wetness from simultaneous stimulation of cold and pressure.

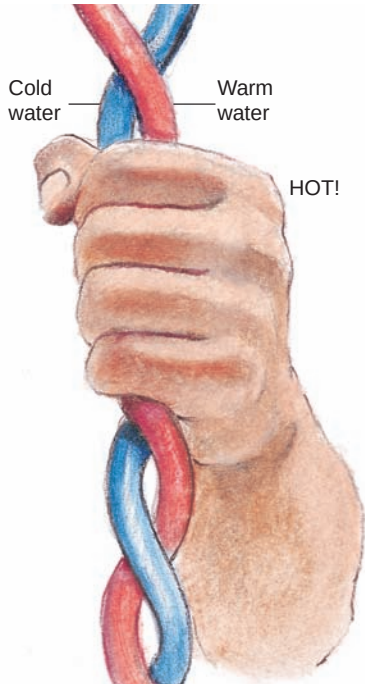
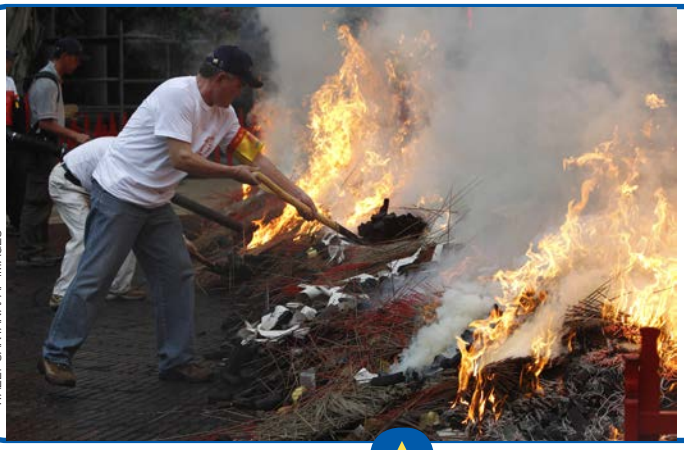


Figure 6.16
When Is Hot Not?

When cold and warm receptors are stimulated at the same time, the result is an eerie sensation of hot.



Mind Control or Physics?

Fire walking is sometimes presented as an example of mental discipline or "mind over matter." In fact, it has much less to do with supposed psychological powers than with basic physics. Burning coals are poor conductors of heat. As long as the firewalker moves at a brisk pace, he is unlikely to burn himself. It's the same principle that allows you to touch a cake in an oven to test for doneness without burning yourself. Cake is a poor conductor of heat. If you touch the metal cake pan, however, you will learn that it conducts heat much more effectively! And if you walked across a metal grid placed atop the coals, the result would be severe burns.

To explain pain, researchers Ronald Melzack and Patrick Wall (1965) have proposed a gate-control theory. According to this gate-control theory, pain messages from the body travel on one set of nerve fibers in the spinal cord, while other kinds of sensory information travel on another set of fibers. The fibers carrying pain messages contain pain gates, which are open when we experience pain. Under some conditions, the non-pain fibers can actually close the pain gates (Wall, 2000). This is why other touch sensations (rubbing the area that hurts or icing it, for example) can partially block the sensation of pain.

These incoming pain messages involve bottom-up processing. But pain also involves top-down processing. That is, your brain significantly affects whether and how you perceive pain. Athletes in competition may not be fully aware of a painful injury until after their competition is completed. Their level of focus blocks the pain messages from conscious awareness.

Body Senses

When people speak of the "five senses," they are referring to sight, hearing, taste, smell, and touch, but two additional body senses are critically important to our functioning—the kinesthetic sense and the vestibular sense.

kinesthetic sense The system for sensing the position and movement of individual body parts.

vestibular sense The system for sensing body orientation and balance, which is located in the semicircular canals of the inner ear.

Your **kinesthetic sense** is the system that senses the position and movement of your individual body parts. It relies on receptor cells located throughout your muscles and joints. I experienced a disruption of this sense when I had surgery to repair a tendon in the pinky finger of my right hand. I was fully conscious during the surgery, and the anesthetic was administered by an injection in my armpit—which sounds worse than it was—while I held my hand behind my head. I temporarily lost all sensation in my arm after this injection. The odd thing was that I felt totally dissociated from that arm. After the injection, my arm was stretched straight out to my side for the operation, but my brain

remembered it as being in the last place it had provided kinesthetic information. In other words, it felt like my hand was still behind my head even though I could see that my arm was straight. A more common disruption of the kinesthetic sense happens when your leg "falls asleep." This occurs when you've held your leg in the same position for so long that the nerve temporarily stops transmitting kinesthetic information. It is almost impossible to walk smoothly until the link is reestablished.

A second body sense, the **vestibular sense,** is the system for sensing body orientation and balance. The vestibular sense is located in your inner ear, and it relies on the fluid-filled semicircular canals perched on top of the cochlea, which are visible in Figure 6.12. The easiest way to disrupt your vestibular sense is to spin in circles until you become dizzy. After you stop spinning, the fluid in the vestibular system continues to spin, much as water continues to swirl in a beaker after you've stopped moving the container. You won't know which way is up until the fluid settles down.

XINHUA/PHOTOSHOT/NEWSCOM

A Balancing Act

Your ability to balance results from the vestibular sense that gets its information from the semicircular canals in the inner ear. Gymnasts like Shawn Johnson use this system to stay oriented no matter what position the body is in.

PAUSE NOW OR MOVE ON

Turn to page 117 to review and apply what you've learned.

Your senses are your windows to the world, sources of the raw information you need to guide your thoughts and behaviors. Now that you know a little about how they operate, surely you'll agree that they're *sensational!*

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 6

Thinking About Sensation

Basic Principles

WHAT'S THE POINT?

6-1 What's a possible real-life application of thresholds, signal detection, sensory adaptation, and selective attention?

- A difference threshold allows us to tell that the heating system needs to be repaired because the room is very gradually becoming cooler than it was.
- Signal detection theory helps us know under what circumstances we will be able to

successfully tell that there is a gas leak from the water heater.

- Sensory adaptation is useful because it helps us grow accustomed to and filter out an annoying constant hum from an air conditioner.
- Selective attention makes it possible to focus on a movie despite being able to hear the conversations of other people in the theater.

Apply What You Know

1. While watching an exciting soccer game, Nadia didn't hear Ed calling her name. Which factor explains her failure to respond to Ed?

   a. selective attention
   b. difference threshold
   c. absolute threshold
   d. sensory adaptation

2. What is the difference between an absolute threshold and a just noticeable difference?

The Visual System

The Nature of Light

WHAT'S THE POINT?

6-2 What is light, and what is the nature of light waves?

- Light is waves of electromagnetic radiation within the visible spectrum.
- The length of a light wave determines the hue, or color, of the light. The amplitude of the wave determines the brightness of the light.

Apply What You Know

3. Light is a form of _____ energy.
4. As Rebecca looks at a light, its wavelength changes. Rebecca experiences this as

   a. a change in the hue of the light.
   b. a flickering effect.
   c. movement of the light from one spot to another.
   d. a change in the brightness of the light.

The Structure of the Visual System

WHAT'S THE POINT?

6-3 How do the structures and receptor cells in the eye work together to detect light waves and change them into neural impulses?

- Light passes through the protective covering of the cornea, passes through the pupil (the hole in the center of the iris), is focused by the lens, and is projected on the receptor cells on the retina.
- The receptor cells (rods and cones) turn the electromagnetic light energy into nerve impulses that can be processed by the brain.

Apply What You Know

5. The two eye structures that focus light are the _____ and the _____.
6. Which of the following structures of the eye is designed to detect only certain wavelengths of light?

   a. pupil
   b. cornea
   c. lens
   d. cones

Color Vision

WHAT'S THE POINT?

6-4 How do the trichromatic theory and opponent-process theory contribute to our understanding of color vision?

- The trichromatic theory explains color vision as a combination of firings of different kinds of receptor cells for color in the retina (cones).
- The opponent-process theory explains that color vision is produced because cones in the retina are paired in opposition, with one member of the pair firing in response to a color and its opposing cone not firing.

Apply What You Know

7. Why is *color deficient* generally a more accurate term than *color blind* to describe people who have trouble seeing the world in normal color?

8. Reversed-color afterimage effects can be explained with the _____ theory of color vision.

Hearing

WHAT'S THE POINT?

6-5 What are the structures of the ear? How do they work to detect sound waves and change them into neural impulses?

- The structures in ears collect sound waves and transform them into neural impulses sent to the brain, creating a perception of sound.
- Sound waves move the eardrum, ossicles, and fluid inside the cochlea. Fluid inside the cochlea moves receptor cells, which creates neural signals that are transmitted to the brain through the auditory nerve.

Apply What You Know

9. Which two structures can be most easily damaged by loud sounds?
   a. the oval window and the auditory nerve
   b. the auditory canal and the stirrup
   c. the tympanic membrane and the hair cells
   d. the hammer and the anvil
10. The snail-shaped organ of hearing is the _____.

Other Senses

WHAT'S THE POINT?

6-6 How are tastes, smells, and touch sensations processed?

- Receptor cells in the nose and tongue absorb chemicals and transmit neural signals to the brain, producing the chemical senses of taste and smell.
- Receptor cells in the skin for pain, warmth, cold, and pressure detect stimuli and transmit signals to the brain.

Apply What You Know

11. How are taste and smell different from the other senses?
   a. Taste and smell have higher difference thresholds than other senses.
   b. Taste and smell rely on chemical stimuli rather than some other form of energy.
   c. Taste and smell are the only senses that are part of the vestibular system.
   d. Taste and smell are top-down rather than bottom-up senses.
12. The _____ theory of pain describes how pain information travels up and down the spinal cord.

KEY TERMS AND KEY PEOPLE

sensation, p. 95
bottom-up processing, p. 95
perception, p. 95
top-down processing, p. 96
absolute threshold, p. 96
difference threshold, p. 97
signal detection theory, p. 98
sensory adaptation, p. 99
selective attention, p. 99
cornea, p. 102
iris, p. 102
pupil, p. 102
lens, p. 102
retina, p. 103
receptor cells, p. 103
rods, p. 104
cones, p. 104
optic nerve, p. 104
blind spot, p. 104
trichromatic theory, p. 105
opponent-process theory, p. 106
pitch, p. 107
cochlea [KOHK-lee-uh], p. 109
hair cells, p. 109
auditory nerve, p. 110
kinesthetic sense, p. 114
vestibular sense, p. 115
Linda Bartoshuk (1938–), p. 112

MODULE 7

Perception

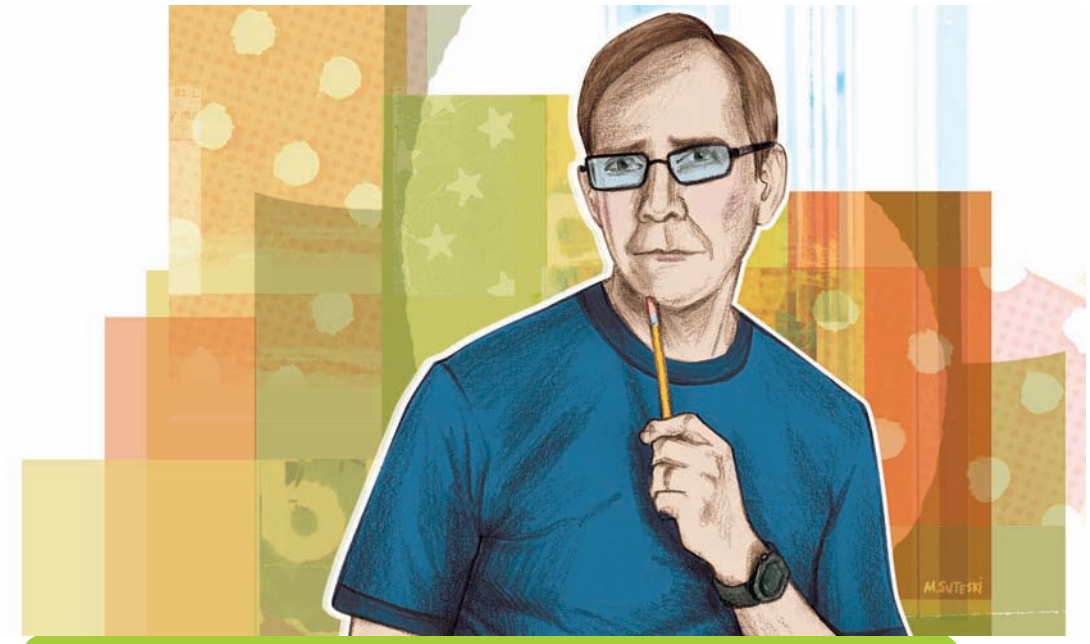
Gestalt Organizational Principles
- Figure-Ground Relationships
- Grouping Principles

Depth Perception
- Binocular Depth Cues
- Monocular Depth Cues

Perceptual Constancy
- Size Constancy
- Shape Constancy
- Lightness Constancy

Perceptual Set

Illusions
- Müller-Lyer Illusion
- Ames Room Illusion
- Gestalt Closure Illusion
- Light Illusions



It's one thing to sense something in the world around you, and another to know what it means. Perception is the process of interpreting what you can see, hear, feel, taste, and smell.

Have you ever tasted one of your parents' favorite foods and found it disgusting? Or felt that a friend's playful shove was rude or even painful? Or disagreed with the popular opinion about a new music video? We are all exposed to the same audio, motion, and color sensations—indeed, to the same wavelengths of light and sound, the same physical touches and movements, and the same chemical tastes and smells. But our **perception** of these things can be different from the perception of others.

perception The process of organizing and interpreting incoming sensory information.

In Module 6, Sensation, we discuss how processing incoming stimulation (sensation) is known as *bottom-up processing.* In this module, Perception, we consider *top-down processing,* the influence that our experiences and expectations have on our perceptions as we organize and interpret incoming sensory information.

Gestalt Organizational Principles

gestalt The "whole," or the organizational patterns that we tend to perceive; the Gestalt psychologists emphasized that the whole is greater than the sum of its parts.

WHAT'S THE POINT?

7-1 How do Gestalt principles affect our perception of what we see?

In nineteenth-century Germany, the Gestalt psychologists offered an alternative to the more common approach of breaking down conscious experience into its most fundamental components. The Gestalt psychologists felt that by breaking experiences into their basic parts, something important is lost—the **gestalt** (or "whole"), the organizational patterns that we tend to perceive. The Gestalt psychologists emphasized that the whole is greater than the sum of its parts.

When I was in high school, my biology teacher used an example to make the point that the whole is greater than the sum of its parts. He led us through an exercise in which we calculated the "value" of a human being. We reduced an imaginary human to the appropriate quantities of the elements found on the periodic table—hydrogen, oxygen, carbon, calcium, iron, and so on—and calculated the cost of each quantity. By adding up the various elements, we determined the cost of the human body. The surprising conclusion was that each of us was "worth" only a few dollars!

This simple biology exercise was a great lesson in how much we miss if we spend too much time breaking things down into ever-smaller pieces (see **Figure 7.1**). The Gestalt psychologists knew this when they urged their colleagues to look at the whole—the entirety, the gestalt. Furthermore, they believed that this was the way human perception occurs. We don't focus on discrete, individual stimuli in our environment; rather, we group them into more meaningful units (Rock & Palmer, 1990). Let's look at the way we use figure-ground relationships and grouping principles—of similarity, proximity, closure, and continuity—to better understand the world around us.

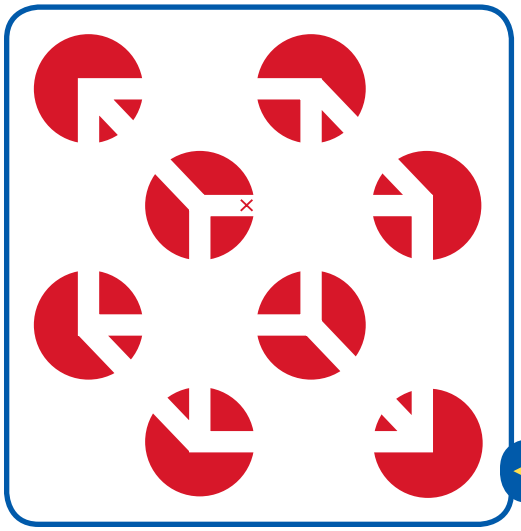


Figure 7.1
A Gestalt

The German Gestalt psychologists of the nineteenth century believed that the whole is greater than the sum of its parts. The parts of this figure are abstract red shapes (think of sliced pieces of pie) on a white background. Yet because of the way those parts are arranged, we perceive much more. The red shapes become circles cut by white lines, and the white lines produce a cube. Even the cube is subject to various interpretations. You can make the tiny X in the center seem to be on either the front edge of the cube or the back (but not both at the same time). You can make the cube seem to appear in front of a background with red circles or behind a white screen with holes cut out of it. (From Bradley et al., 1976.)

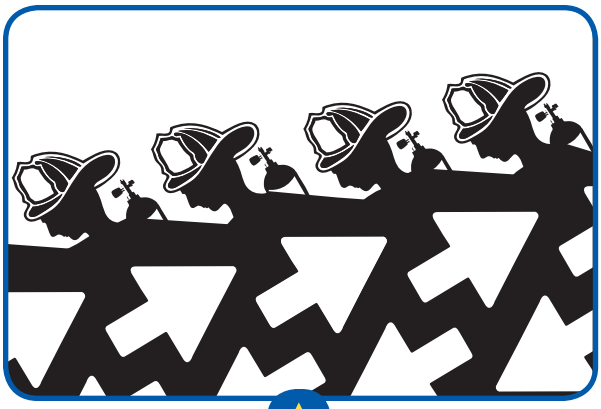


Figure 7.2
What Do You See?

If black is the figure, you see firemen hurrying down the stairs. If black is the ground and white is the figure, you see arrows instead.

Figure-Ground Relationships

Gestalt psychologists pointed out that we naturally organize our environment into **figure-ground** relationships. We organize the visual field into objects (the figures) that stand out from their surroundings (the ground). In most photographs and visual scenes, you can easily pick out the *figure*. It will be some object that draws your attention, and it probably will be nearer the center of the visual field than the edge. It may be moving, and it will often be fairly large and colorful. The *ground* consists of the surrounding aspects that we commonly call the background. For example, in a photo of a jet flying across the sky, the airplane is the figure and the sky is the ground. In a sports photo, the swimmer touching the wall at the end of the race is the figure, and the other swimmers, the lane markers, the side of the pool, and the water itself are the ground. Sometimes the relationship between figure and ground is more ambiguous, as in **Figure 7.2,** which produces a reversible figure.

The tendency to perceive figure and ground is not exclusively visual. We strive to identify the figure in other contexts as well, such as the predominant taste in a casserole or the melody of a song.

figure-ground The organization of the visual field into objects (figures) that stand out from their surroundings (ground).

grouping The perceptual tendency to organize stimuli into understandable units.

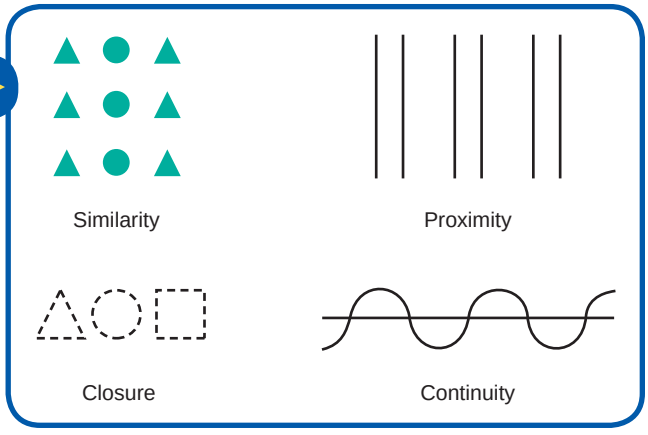
Grouping Principles

The Gestalt psychologists also believed people are predisposed to organize stimuli by **grouping** them into understandable units. Several principles guide the way we group stimuli—similarity, proximity, closure, and continuity (see **Figure 7.3**):

- *Similarity*—Perhaps the most basic principle of grouping is similarity. We place items that look similar in the same group. This is easy to see in team contests: All the players wearing blue shirts are from the University of Michigan; all those wearing red shirts represent the University of Wisconsin.
- *Proximity*—Proximity comes from the word *approximate,* which means "close." If objects are close together, we place them in the

Figure 7.3
Gestalt Grouping Principles

Similarity leads us to see two groups of triangles and one group of circles. Proximity leads us to see three groups of two lines each. Closure leads us to see intact shapes where there are none. Continuity leads us to see one long wavy line and one straight one, rather than four half-circles. Our brains are programmed to group objects to help us make sense of the world around us.



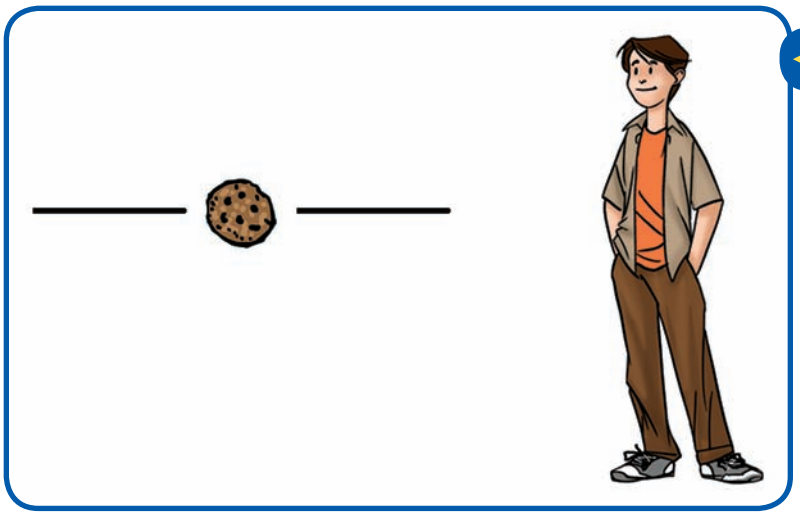


Figure 7.4
Closure and the Blind Spot

Close your right eye, look at the boy, and slowly adjust the distance between your eye and the page until the cookie disappears (about a foot). When the cookie disappears, the two line segments will appear to join into one continuous line as your brain strives to create a gestalt.

same group. Not only do the Michigan Wolverines basketball players wear the same uniform, they also share the same bench. It is partially because they are near one another, in proximity, that we put them in the same group.

- *Closure*—Our brain's tendency to look for the whole, not the parts, drives us to fill any gaps in a perceptual field. Look at **Figure 7.4.** When you follow the directions to make the object disappear, you will notice that the horizontal line appears to continue right through the area—there is no longer a gap in the line! Your brain doesn't like gaps, so it assumes this one doesn't belong there and fills the space for you. The principle of closure also allows you to perceive the cube shown earlier in Figure 7.1. The cube is in your head, not on the paper.
- *Continuity*—Once an object appears to move in a particular direction, your brain assumes that the movement continues unchanged. When highways require you to turn, for example, you can easily lose your way unless you really pay attention to the signs. We tend to assume the highway continues in the direction we've been moving.

PAUSE NOW OR MOVE ON

Turn to page 135 to review and apply what you've learned.

Depth Perception

WHAT'S THE POINT?

7-2 How can we see in three dimensions?

Consider how difficult life would be if you couldn't use **depth perception** to see in three dimensions and to judge distance. You would not be able to drive: You rely on your ability to perceive depth in parking,

depth perception The ability to see in three dimensions and to judge distance.

visual cliff A laboratory device for testing depth perception in infants and young animals.

binocular cues Depth cues that require the use of both eyes.

monocular cues Depth cues that require the use of only one eye.

retinal disparity A binocular depth cue resulting from slightly different images produced by the retina of the left eye and the retina of the right eye.

determining when it's safe to pull out onto a busy street, and deciding if you can safely pass another car. Sports would also be impossible: Depth perception guides you when you position your hands to catch a ball, time a volleyball spike, and shoot accurate free throws. And think of the little things like threading a needle, tossing wadded-up paper into a recycling container, and placing clean dishes on a shelf. All these actions depend on depth perception.

Is this vital human skill a product of nature or nurture? Eleanor Gibson and Richard Walk explored this question using a device called the **visual cliff,** laboratory equipment for testing depth perception in infants and young animals (see **Figure 7.5**). The visual cliff ensures the infant's safety while allowing researchers to determine whether an infant perceives depth. Gibson and Walk's (1960) research indicates that even young infants just barely able to crawl are reluctant to move past the edge of what appears to be a drop-off, so depth perception might be, to some extent, inborn. Research with other species supports this nature view: Depth perception exists even for animals mobile at birth. But research also supports the nurture view. By the time children can crawl, they have already had a lot of interaction with the environment, so their reluctance to venture over the edge of a cliff may be learned. For example, 5-month-old babies do not use a toy's shadow to help determine how far away it is, but 7-month-year-olds do (Yonus & Granrud, 2006). Depth perception improves as children experience increased interaction with the environment (Campos et al., 1992). As is almost always the case, both nature and nurture are important.

Given our anatomy, it's amazing that we even have these impressive abilities to perceive depth. The retina is a two-dimensional surface, yet we use it to determine height, width, *and* depth. Working together, your eyes and brain use a number of tricks to create that third dimension. Some depth cues are known as **binocular cues,** requiring the use of both eyes. Other depth cues are **monocular cues**—requiring only the use of a single eye.

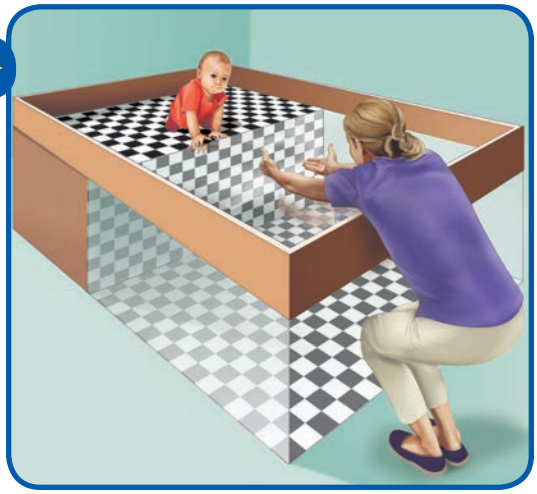


Figure 7.5
The Visual Cliff

This device can safely test infants for the ability to perceive depth. Infants are reluctant to crawl onto the glass protecting them from the drop-off, even when their primary caregivers coax them to do so.

Binocular Depth Cues

Do you remember playing with a View-Master toy when you were young? To use this toy, you insert a round card containing pictures into a viewer and look through the eyepieces. What you see is an image with astounding depth. How does this seemingly simple toy create these complex images? The trick is that the toy's design relies on the binocular depth cue known as **retinal disparity,** which results from the slightly different images that fall on the retina of your left eye and the retina of your right eye. Let's see how this works.

If you look closely at the card containing the View-Master pictures, you will see that it seems to contain two identical pictures for each scene. But these images differ slightly because they were taken by cameras a couple of feet apart, with slightly different vantage points. The View-Master projects the image taken by the left camera only to your left eye and the image from the right camera only to your right eye. Your brain uses the different views to calculate distance and add depth to the scene.

Your brain does this easily because it uses the same technique all the time in real life. The two "cameras" are your two eyes. Because they are separated by a couple of inches in your head, your eyes receive slightly different views of any given scene. You can demonstrate this for yourself by creating the "finger sausage" described in **Figure 7.6.** This sausage appears to jump back and forth precisely because each of your eyes has its own distinct vantage point. View-Masters exaggerate the effects of retinal disparity because the two cameras that took the photos were separated by more than the couple of inches separating your eyes. For another example of an image that relies on retinal disparity, try your

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The View-Master: A Binocular Depth Toy

This classic childhood toy produces an enhanced sense of depth by exaggerating the effect produced by retinal disparity. A separate image is projected to each of the child's two eyes. These images were taken by two cameras placed a couple of feet apart.

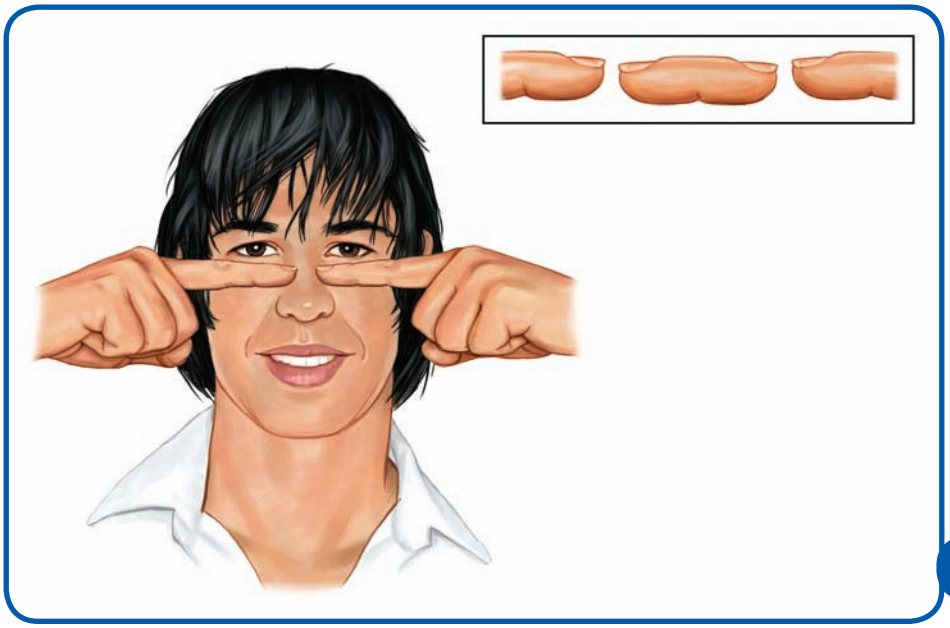


Figure 7.6
The Binocular Finger Sausage

To see a bizarre illusion created by binocular vision, point your two index fingers together about five inches in front of your eyes with a half-inch gap between their tips. Look beyond them and you will see a finger sausage. By adjusting the distance separating your fingers or the distance between your fingers and your eyes, you can make the sausage grow and shrink. When you tire of it, simply close one eye. Without binocular vision, there can be no sausage. Note that when you alternately close one eye and then the other, the gap between your fingers jumps from side to side. It's your brain's attempt to combine these two views that creates the sausage in the first place.

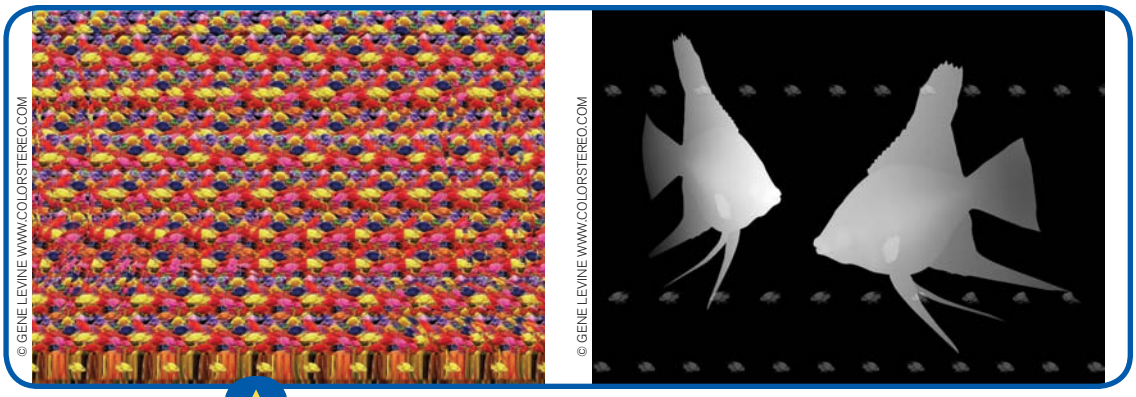


Figure 7.7
Random Dot Stereogram

The ability to see an intriguing image in the stereogram to the left depends on retinal disparity. To make the repeating pattern of three-dimensional fish appear (the image on the right shows a portion of what you are looking for), you must trick your eyes into thinking the paper is either twice as far, or half as far, from your eyes than it really is. Try relaxing your eyes so they slowly swing outward. When you are at the proper depth, the dots projected to your right eye will align with the dots projected to your left eye to form the three-dimensional image. The dots that create the fish are among the other dots and become apparent only when your eyes line them up properly. If you have trouble, it simply means your eyes are difficult to trick; they want to focus at the proper depth.

luck at **Figure 7.7.** (Don't give up if you don't immediately see it.) Once you're able to produce the three-dimensional image, close or cover one eye. The effect will end, showing that this image was a creation of your two eyes interacting with your brain.

Retinal disparity is most effective when you are viewing items close to you. The farther away the object is, the less difference the placement of your eyes makes. The finger sausage jumps more when you hold your hands about six inches in front of your face than it does when you hold your arms farther away. Try it and you'll see.

The second binocular cue, **convergence,** translates tension in the eye muscles when the eyes track inward to focus on objects close to the viewer. If you were able to draw a line from each eye to a distant object, those lines would be parallel. To maintain your focus on that object as it moved closer to you, your eyes would both have to swing inward. This movement puts tension on the muscles that control your eyeballs, and your brain notices that tension. The more tension required to keep both eyes aimed at the object, the closer the object must be. To feel this, focus on your finger with your arm fully extended. At this point, there is not much tension. However, as you continue to focus and slowly draw your finger closer to your nose, your eyes will "cross." The closer your finger gets, the stronger the tension will be.

As you can see, convergence, like relative disparity, predicts depth most effectively at relatively short distances. Depth perception at longer distances relies mostly on the monocular cues, the next topic.

Monocular Depth Cues

People who have lost vision in one eye cannot use retinal disparity or convergence cues. But they can calculate depth accurately using the monocular cues, which continue to operate even if when using just one eye. Artists use monocular cues to build a sense of depth into their paintings and drawings. Using them, a painter can "trick" our two-dimensional retinas into seeing three dimensions on a two-dimensional canvas. There are quite a number of these cues. We discuss seven of them:

convergence A binocular depth cue related to the tension in the eye muscles when the eyes track inward to focus on objects close to the viewer.

1. *Relative size*—One of our best monocular depth cues is the perceived size of an object. If an object of known size appears large, it is probably close, and if the object appears small, it is probably distant. Passenger jets passing over your home at 35,000 feet appear so tiny it's hard to believe they hold full-size people inside. But you know the plane's real size, and the fact that it appears small is one of the main ways you know it is far away. That same plane flying only 20 feet over your home would appear frighteningly large.

   Don't underestimate how important monocular cues like relative size are. If you are driving a car, someone walking in the distance appears small. However, if that someone *is* small—a child—you might mistakenly believe the person is farther away than is actually the case. Tragic accidents can result from such misperceptions (Stewart, 2000).

CHARITY BECK/*THE NEW YORK TIMES*/REDUX

Relative Size

The broadcasters in the foreground appear larger than the more distant fans and players.

2. *Relative motion*—Perceived slowness indicates that an object is distant. If a passenger jet passed 20 feet over your house, it not only would appear large but also would appear to be moving exceptionally fast. A plane flying high overhead seems to just barely crawl across the sky, yet you know it is moving several hundred miles an hour.

3. *Interposition*—This cue is so obvious that, unless you think about it, you may fail to realize its significance: Closer objects partially obstruct the view of more distant objects. You know a tree is in front of a house because it blocks your view of part of the house. If the tree were more distant than the house, the house would block your view of the tree. If you're thinking, "Well, duh," be impressed that your brain uses even simple information to assess depth.

Interposition

You know the number 7 horse is closer to you than the other horses because the number 7 horse partially blocks the view of the other horses.

4. *Relative height*—Distant objects appear relatively higher in your field of vision than close objects do. This is why trees on the far side of a lake will appear to be above the lake, which is closer to you.

5. *Texture gradient*—Distant objects usually have a smoother texture than nearby objects. A grassy park that appears to be a smooth carpet of green from a distance shows more and more texture as you move closer to it. When you reach the park, you can see individual blades of grass and weeds (and perhaps bugs, twigs, and wads of discarded chewing gum). The Black Hills in South Dakota appear uniformly "black" because of the dark green color of the fir trees. You can't see the individual trees (or boulders or streams) until you draw close.

MITCH WOJNAROWICZ/THE IMAGE WORKS

Texture Gradient

Individual trees are visible in the foreground, but in the distance the trees look smooth and dark, giving the Black Hills their name.

ROBERT FRIED

6. *Relative clarity*—Distant objects are less clear than nearby objects. This monocular cue mostly functions outdoors, where distant objects have a bluish, hazy appearance because of the moisture and dust in the air. Smog can exaggerate your perception of depth, causing landmarks to appear farther away than they really are in a city beset by moist, dusty air. In the dry, clear American Southwest, however, distances appear compressed. You may drive over a hill and view mountains that seem close enough to reach for a lunchtime picnic. In reality, you may be lucky to get there by suppertime!
7. *Linear perspective*—Parallel lines seem to draw together in the distance. If you stand on a straight section of highway and look down the road, the shoulders of the road will seem to come ever closer to each other until they eventually merge at a point on the horizon.

Considered together, these seven monocular cues—relative size, relative motion, interposition, relative height, texture gradient, relative clarity, and linear perspective—and the binocular cues of retinal disparity and convergence provide a small but powerful arsenal of tools to help us perceive depth. "Look before you leap" is good advice partially because distance cues allow you to determine how far away your landing spot is (see also Psychology in the Real World: Motion Perception).

Relative Clarity

The distant mountains look blue and hazy because of dust and moisture in the atmosphere.

PINKCANDY/SHUTTERSTOCK

RAINER GROSSKOPF/STONE/GETTY IMAGES

Linear Perspective

The lights leading the way to this runway seem to come together in the distance.

Psychology in THE REAL WORLD

Motion Perception

Our ability to perceive motion is just as critical for survival as is our ability to perceive depth. In many ways, motion perception is the more complex task. To perceive motion accurately, you must interpret a large number of variables rapidly. Not only does the object move, but so does your body. Swing your head from side to side and you will see a great deal of motion—motion that you correctly conclude is a result of head movement rather than object movement.

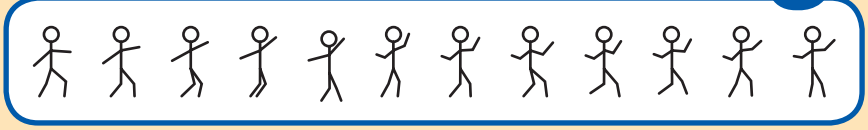
Sometimes, however, our conclusions are wrong, and we perceive motion when there is none. These mistakes are not all bad. We rely on this illusion of movement to make movies *move.* When we go to the cinema, we are able to "see" motion from a rapidly projected (24 images per second) series of slightly varying still images. This illusion is called *stroboscopic motion,* an outcome you've used to your advantage if you've ever created a "flip movie," such as the one that we've begun in **Figure 7.8.**

A second and equally handy example of an apparent motion effect is the *phi phenomenon,* which creates the illusion of movement when fixed lights are turned on and off in sequence. Highway construction sites often use the phi phenomenon to create signs with arrows that appear to move, directing motorists to merge into a smaller number of lanes. Computerized marquee signs and even strings of holiday lights also use this illusion, as do sports scoreboards. A stadium scoreboard at the University of Northern Iowa, located in my town, is programmed to display a panther, the team mascot, leaping across the display area. The action seems so real that it's easy to forget that all you're looking at is a bunch of tiny lights blinking on and off.

Figure 7.8

Movement That Isn't Movement—Courtesy of Stroboscopic Motion

Each of these figures differs only slightly from the ones on either side of it. This is the first step to creating stroboscopic motion: Project each figure rapidly one after the other in order, and the resulting figure would appear to dance. (From Brittany Buchholtz.)



perceptual constancy Perceiving the size, shape, and lightness of an object as unchanging even as the image of the object on the retina of the eye changes.

PAUSE NOW OR MOVE ON

Turn to page 136 to review and apply what you've learned.

Perceptual Constancy

WHAT'S THE POINT?

7-3 What happens to our visual perception of an object if the lighting, the distance to the object, or the viewing angle changes?

One amazing quality of human perception is **perceptual constancy,** perceiving the size, shape, and lightness of an object as unchanging even as the image of the object on the retina of the eye changes. The world would be a more frightening place if we did not have perceptual constancy. It is comforting to have a deep understanding that things will remain constant, despite changes in the distance, angle of view, or level of lighting of an object. There are three major kinds of perceptual constancy: size constancy, shape constancy, and lightness constancy.

Size Constancy

Recall from our discussion of depth perception that an object's size is one of the best cues we have in judging the distance of an object. This relationship between size and distance is one of the most fundamental in depth perception: Objects that appear big are close, and objects that appear small are distant. What happens, however, when an object approaches you? Consider a friend walking toward you from the end of the street. Because your friend is some distance away, she appears quite small. But then her image on your eyes grows larger and larger. Is she becoming bigger? Of course not! She is moving closer. That's the point of *size constancy:* We expect size to remain constant. Our knowledge of the world leads us to conclude that when the apparent size of an object changes the actual size is not changing at all. What's changing is the distance.

You can use the flag demonstration in Figure 6.10 in Module 6 to explore this size-distance relationship. If you follow the instructions and watch for an afterimage to appear in the white square in your book, you will find that the image is quite small (about the same size as the weirdly colored version of the green, black, and yellow flag). If you try the exercise again and watch for an afterimage on a wall across the room, the size of the image will be strikingly different. This time, you will see a large flag because the wall is farther away than the page in your book. Because the actual image on your retina is exactly the same size in both cases (it was produced by looking at the same stimulus in your book), your brain *concludes the image on the wall must have been produced by a bigger flag.* Only if the flag itself were larger could the retinal image be the same. Your brain has confused size and distance cues.

PETE TURNER/THE IMAGE BANK/GETTY IMAGES

(a) (b)

Figure 7.9
Size-Distance Relationships

Sometimes size and distance cues make it hard to perceive accurately. (a) The monocular depth cues of relative height and linear perspective force us to see the monster on the right as more distant. We therefore think that this monster must be bigger to produce the same size image at our eyes. But each monster is the same size. (b) This illustration of a trick called the Ponzo illusion works the same way as the monsters. Depth cues force us to see the top bar as more distant, and this assumption leads us to distort our interpretation of size. The bars are actually the same size.

Other examples of illusions based on a misperception of size and distance cues appear in **Figure 7.9.**

Consider how frightful the world would be without size constancy. As someone drew closer to you, you would have to stop and wonder whether that person was morphing into a giant before your eyes! Size constancy spares us such thoughts and allows us to be comfortable in our knowledge that the objects around us are not changing.

Shape Constancy

Shape constancy assures us that an object's shape has not changed even though our angle of view indicates it may have done so. As **Figure 7.10** illustrates, a closed door viewed straight on appears rectangular, which, of course, it is. But if someone begins to open the door, that rectangle will look like a trapezoid. Despite the changed appearance, you have no doubts about the shape of the door. You instantly realize that it's the viewing angle that has changed and not the door itself.

We automatically correct for changing angles in a number of different situations. The next time you have to sit to the side when your teacher uses the projector, note that the screen becomes a trapezoid. Your brain will automatically correct for the distorted angle, and you will perceive the projected images as though you were viewing the objects straight on. Shape constancy lets you make these automatic corrections.

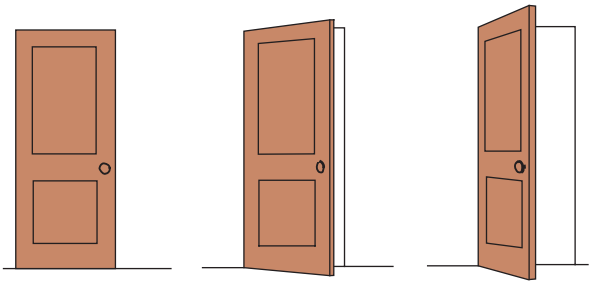
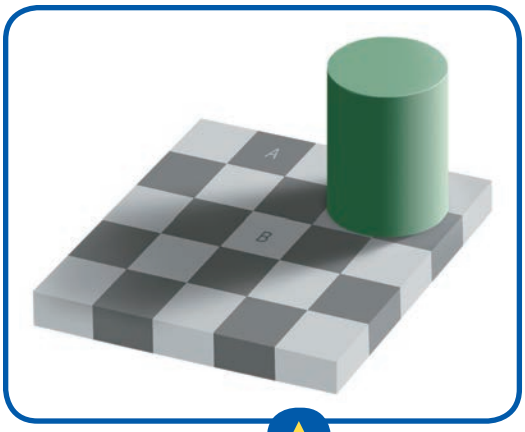


Figure 7.10
Shape Constancy

As a door opens, its shape changes from a rectangle to a trapezoid. Shape constancy ensures that we continue to perceive the door as a rectangle.



COURTESY EDWARD ADELSON

Figure 7.11
Lightness Constancy

In this astonishing illusion, the squares A and B are actually the exact same shade of gray. You can photocopy the figure and cut out the two squares to prove it to yourself. It's the surrounding context that forces us to perceive the two squares so differently.

Lightness Constancy

The third type of constancy, *lightness constancy,* gives us the ability to see an object as having a constant level of lightness no matter how the lighting conditions change (see **Figure 7.11**). If you look at a sheet of printer paper in bright sunlight, it appears blazingly white; view the same sheet in a dimly lit room, and it appears gray. Has the paper changed? Of course not. We know that the "white" paper stays constant no matter what the lighting conditions are. We can make this adjustment even if we are outside, reading a page that is half in sunlight and half in shade. Without lightness constancy, this experience would be quite bizarre.

PAUSE NOW OR MOVE ON

Turn to page 136 to review and apply what you've learned.

Perceptual Set

WHAT'S THE POINT?

7-4 How do our expectations affect what we perceive?

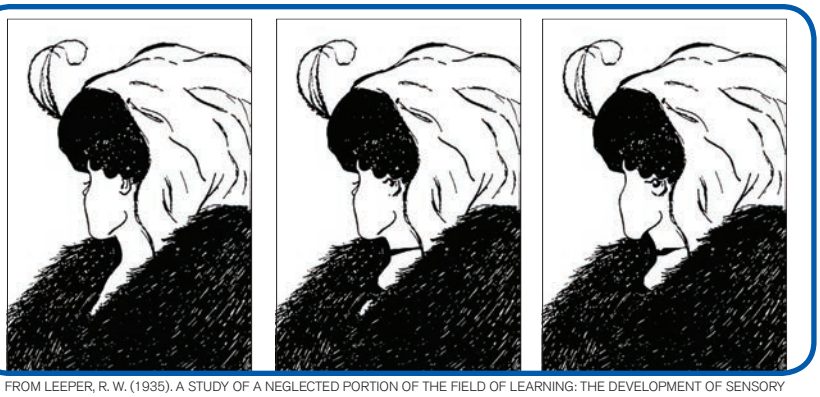
Have you ever stopped to consider just how important your expectations are in any given situation? What happens in a class if you expect a teacher to be boring? If your favorite band is giving a concert, and you expect it to be wonderful, how much does that influence your perception of the concert? If you've grown to like a particular TV show, do your expectations that the show will be good affect how you react to tonight's episode?

perceptual set A mental predisposition to perceive something one way and not another.

Expectations such as these produce **perceptual set,** a mental predisposition to perceive something one way and not another. Perceptual set is perhaps the clearest example yet of top-down processing, and this mind-set can profoundly affect our view of the world. Look, for example, at **Figure 7.12.** You can predispose a person toward seeing either a saxophone player or a woman's face in the middle photo by showing either the left or the right picture first

Figure 7.12
Perceptual Set

Cover the side pictures and ask a few friends what they see in the center. You can influence them to see the young woman by first having them glance briefly at the picture on the left. Similarly, a glance at the picture on the right will drive them toward interpreting the center picture as an old woman.



FROM LEEPER, R. W. (1935). A STUDY OF A NEGLECTED PORTION OF THE FIELD OF LEARNING: THE DEVELOPMENT OF SENSORY ORGANIZATION. *JOURNAL OF GENETIC PSYCHOLOGY,* 46, 41-75. REPRINTED BY PERMISSION OF TAYLOR & FRANCIS LTD, HTTP://WWW.TANDF.CO.UK/JOURNALS

(Boring, 1930). If you show the unambiguous (clear) saxophone player first, the person will be more likely to see the saxophone player in the ambiguous center drawing. If you show the woman's face first, the person will be more likely to see the woman's face in the center drawing.

This "power of suggestion" produced by perceptual set influences us in many ways. Six times as many preschool-age children think french fries taste better when they are served in a McDonald's bag instead of a plain white bag (Robinson et al., 2007). Perceptual set may also account for multiple false reports of unidentified flying objects, for example, after people hear a report of one such false incident. The first report creates a perceptual set that influences what other people perceive. (Also see Thinking Like a Psychological Scientist: Extrasensory Perception). Perceptual set also accounts for reports of "subliminal messages"

Thinking Like a PSYCHOLOGICAL SCIENTIST

Extrasensory Perception

You've seen the stories about **extrasensory perception (ESP),** the controversial claim that perception can occur apart from sensory input. Perhaps you've talked to people who believe they've had an ESP experience. Perhaps you think you have had one yourself. These beliefs are widespread, with several surveys showing that around half of all Americans believe in ESP (AP, 2007; Blackmore, 1997; Gallup & Newport, 1991; Nishizawa, 1996).

Belief in ESP sustains a billion-dollar industry (Nisbet, 1998). Infomercials by psychics are a staple for late-night and cable TV broadcasters, and advertisements by psychics fill the back pages of countless magazines and *National Enquirer*–type newspapers in print and online. Some police departments have even called on psychics to help locate missing persons and attempt to solve other difficult crimes.

Some psychologists, including groups working at five British universities, investigate claims of ESP (Turpin, 2005). Skeptical scientists, however, are much more likely than the general public to assume the claims are false. This doesn't mean scientists are somehow "mean" or cynical, only that they require proof before accepting a claim.

What accounts for this difference between public opinion and scientific opinion? The answer is that we often misinterpret *correlations,* which are statements of how two events are related. Consider this strange coincidence: I'm thinking about my friend and he suddenly calls. I'm likely to notice that these two events—my thoughts and the phone call—occurred together, be impressed with the timing, and perhaps assume that I have a psychic ability. But the fact that these two events were correlated does *not* mean that my thoughts caused my friend to call. What I'm failing to notice is the number of times I think of my friend and he doesn't call, and the number of times he calls when I haven't been thinking about him. These instances are much less likely to stand out in my memory because they seem much more ordinary. Similarly, you may be impressed when you dream about an event that then occurs the next day. That's impressive, but when you consider how often your dreams do not become reality the next day, this single event seems more likely to be a simple, ordinary coincidence.

If such events were not mere coincidences, shouldn't those who claim to have psychic abilities be able to exercise their powers more reliably? In 26 years of tracking annual psychic forecasts, the psychics had no success in predicting the coming year's most important events (Emery, 2004). Why are they unable to provide adequate warnings before floods or tornadoes? Why is it impossible for them to locate missing persons? And, most telling, why are these people with ESP always on television asking for our credit card numbers instead of picking the winning lottery numbers and living off the proceeds?

extrasensory perception (ESP) The controversial claim that perception can occur apart from sensory input.

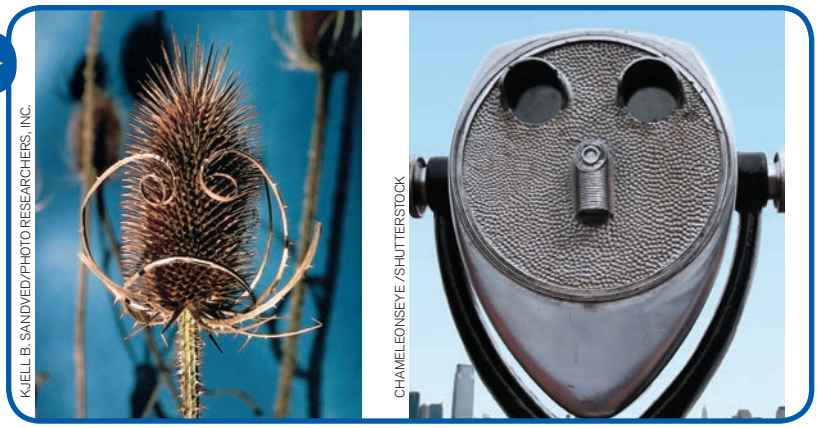


Figure 7.13
Face Schemas

We have such a strong schema for faces that we tend to see them everywhere.

in the media. When I was a college student in the 1960s, my friends and I wiled away many hours playing Beatles music backward on our turntables (this was long before the days of iPods). We were listening for messages about band member Paul McCartney, who was inaccurately rumored to be dead. We were finding them, too. Once you've determined that the recording *might* say, "Paul is dead," it is almost impossible *not* to hear the message in the weird sounds produced when you play recorded music backward. We hear the message we expect to hear. If we'd started with the perceptual set that the ambiguous segments would say, "Dolls eat bread," that is what we would have forever heard.

Perceptual set is often guided by *schemas,* concepts or mental frameworks that help us organize and interpret information about the world. One of our strongest schemas is for faces. We are so driven to create faces that we tend to see them everywhere (see **Figure 7.13**).

PAUSE NOW OR MOVE ON

Turn to page 136 to review and apply what you've learned.

Illusions

WHAT'S THE POINT?

7-5 How can the principles of perception explain illusions?

Perceptual illusions fascinate almost everyone. We are usually superb at decoding the nuances of the world around us. But sometimes—most often under fairly elaborate conditions—we are "tricked" into misinterpreting sensory stimuli. Psychologists study illusions because they provide clues about how our sensory and perceptual systems work. In this section, we look at several illusions. In each case, some basic perceptual principles help create the illusions. As you consider each illusion, see if you can link it to one or more of the principles you've read about in this module.

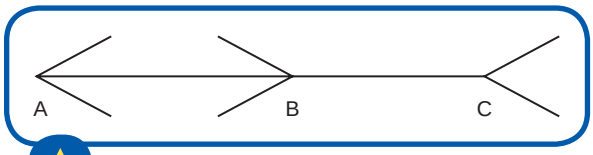


Figure 7.14
The Müller-Lyer Illusion

Which line appears longer—segment AB or segment BC?

Figure 7.15
Why Do We See the Müller-Lyer Illusion?

One suggested explanation (Gregory, 1968) is that we use the arrows at the ends of the lines to help judge distance and, thus, length.

Müller-Lyer Illusion

This famous puzzle, the Müller-Lyer illusion, has been around since the late 1800s. You will see the illusion if you compare line segment AB with line segment BC in **Figure 7.14.** Does one appear longer? To most people the lines seem about the same, but if you measure them, you will see that AB is quite a bit longer. There are different explanations for this illusion, as there are for most illusion puzzles. One possibility, illustrated in **Figure 7.15,** is that we have learned to interpret arrowheads at the ends of a line as an indication of distance, which leads to a misapplication of size-distance relationships.

Ames Room Illusion

In the next famous illusion, the Ames room, two people seem to change size as they switch positions in the room. A person who appears small on one side of the room is suddenly huge on the other side. Turn the page to see **Figure 7.18,** which reveals the secret. The room is distorted. When we view the room from the perspective of the peephole (as the camera did), however, we assume it is a standard, rectangular room. (Why wouldn't it be?) This is why we perceive the person who is closer as being larger. Our minds don't let us see that person as closer because that would defy what we have learned about the structure of normal rooms.

The Ames Room

How can this be? The Ames room creates a remarkable illusion of changing size.

RICHARD T. NOWITZ/PHOTO RESEARCHERS, INC.

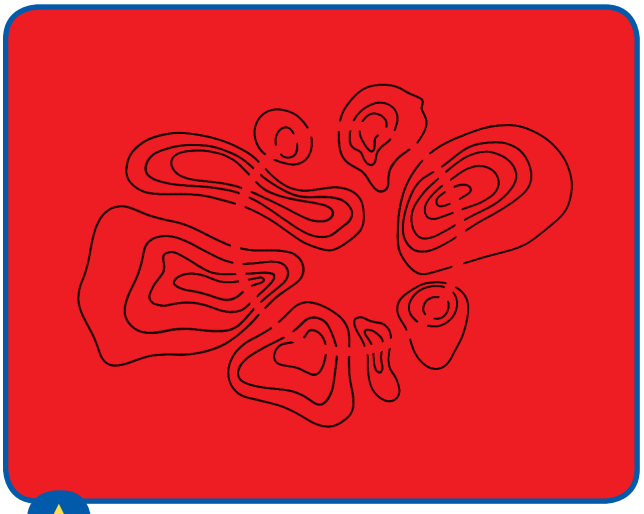


Figure 7.16
An Illusion Based on the Gestalt Principle of Closure

When is a red ring not really there? When the Gestalt principle of closure causes you to perceive it filling in the gaps in the black lines. Try covering up the black lines on both sides of a gap and you'll see that there is only one shade of red in this figure.

Gestalt Closure Illusion

Do you see the light-red ring in **Figure 7.16?** Well, it isn't there. If you look at a section of the "ring" that falls between the black objects and cover up the black lines, you will see that the area is just as red as the rest of the page. We perceive the light-red ring because of the Gestalt grouping principles. Our brains try to find closure for all those gaps in the black lines by seeing a ring that connects them.

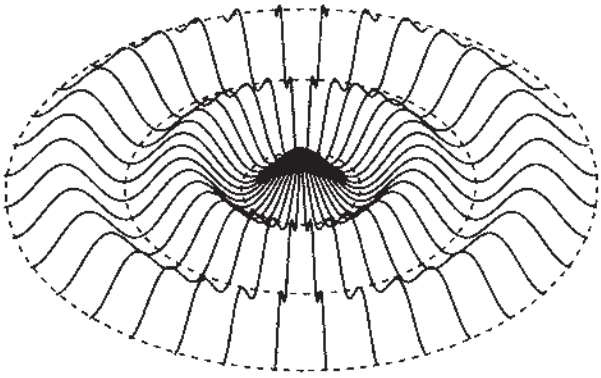
Light Illusions

The two illusions in **Figure 7.17** depend on shadow and light. Notice in Figure 7.17a that there appears to be a ripple. Even though this pattern is printed on flat paper, it is difficult to interpret it as a flat drawing. Note that the ridges change quite impressively if you turn the book upside down: The area of the drawing that had represented a valley now represents a hill. This reversal happens because we assume that light normally comes from above (Hoffman, 1998). You can see a similar light and shadow effect in Figure 7.17b. The smaller circle in the upper right appears to bulge out from the background. The smaller circle at the lower left appears to dip in. This happens because we perceive the light source to be coming from above. If you turn the diagram upside down, the bulge and the dip reverse themselves, conforming to our assumption that a light is coming from above.

Figure 7.17
Two Illusions Based on Our Assumptions About Light

Both image (a) and image (b) look different if you turn the book upside down. We always assume that light shines down from above.

(a)



(b)

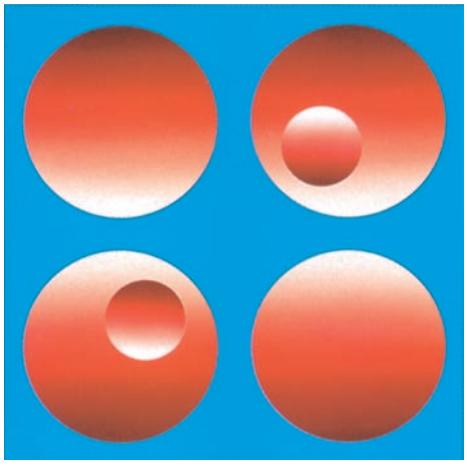


PHOTO BY GEORGE V. KELVIN, FROM "PERCEIVING SHAPE FROM SHADING," BY VILAYANUR S. RAMACHANDRAN. 1988 SCIENTIFIC AMERICAN, INC.

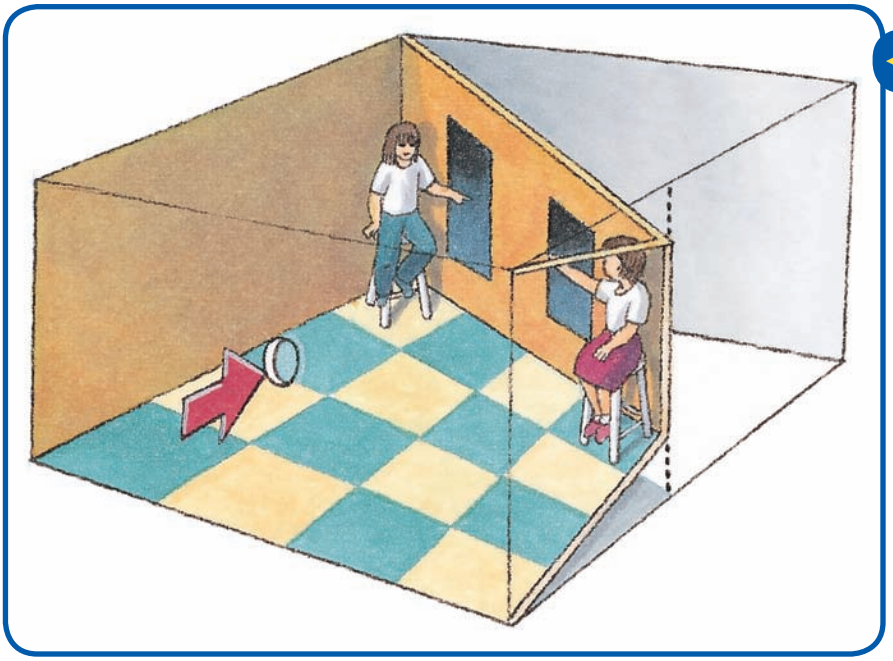


Figure 7.18
Distorted Size

This view of the specially designed Ames room explains the puzzle shown earlier of incredibly shrinking and growing girls. It violates our expectations for how a room should be constructed, and we're tricked into thinking the size of the girls has changed, rather than the dimensions and angles of the room.

PAUSE NOW OR MOVE ON

Turn to page 137 to review and apply what you've learned.

Perception is the road we follow to make sense of the world. The constant stream of sensory input that bombards us is meaningless unless we can interpret it properly. We accomplish this so effortlessly that we are usually aware only of our rare mistakes. Perceptive, aren't we?

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 7

Thinking About Perception

Gestalt Organizational Principles

WHAT'S THE POINT?

7-1 How do Gestalt principles affect our perception of what we see?

- In figure-ground relationships, we perceive a central focus (figure) of an image in the foreground against a background (ground).
- We group objects into groups because they are similar (similarity), because they are close to one another (proximity), because they help form a complete image (closure), or because they are part of a continuous pattern (continuity).

Apply What You Know

1. Which of the following were the Gestalt psychologists most interested in?

a. why we see a white afterimage after staring at a black figure
b. how a person with vision in only one eye can judge distance
c. how we organize objects into groups
d. why we perceive something small as farther away

2. The object that attracts our attention in a visual scene is the _____.

Depth Perception

WHAT'S THE POINT?

7-2 How can we see in three dimensions?

- Two of the most important depth perception cues, retinal disparity and convergence, are possible because we have two eyes (binocular cues).
- Other depth perception cues, including relative size, relative motion, interposition, relative height, texture gradient, relative clarity, and linear perspective, can be seen with one eye (monocular cues).

Apply What You Know

3. Briefly describe how three monocular depth cues operate.
4. When do people develop depth perception?
   a. at about age four when they start to develop perceptual sets
   b. at birth or in early infancy
   c. when the visual cortex of the brain develops during early adolescence
   d. when they are capable of developing gestalts

Perceptual Constancy

WHAT'S THE POINT?

7-3 What happens to our visual perception of an object if the lighting, the distance to the object, or the viewing angle changes?

- We perceive the characteristics of objects as constant (perceptual constancy) even though their apparent size, shape, and brightness change in different lighting conditions, at different distances, and with different angles of viewing.

Apply What You Know

5. Why *wouldn't* you perceive an opening rectangular door magically turning into a trapezoid?
   a. size constancy
   b. shape constancy
   c. lightness constancy
   d. distance constancy
6. Without size constancy, we would think objects become _____ the farther they are from us.

Perceptual Set

WHAT'S THE POINT?

7-4 How do our expectations affect what we perceive?

- Perceptual sets, our predispositions about what we expect to see, change how we organize sensations into perceptions. In general, we perceive what we expect to perceive.

Apply What You Know

7. Which of the following is an example of perceptual set?
   a. seeing a violent image in a blurry photograph because your friend told you it was a photo of a big fight
   b. seeing circles on a page in one group and triangles in another
   c. seeing movement in a movie even though you know you're watching a series of rapidly projected still images
   d. seeing an airplane as high up in the sky because it appears to be tiny
8. We are likely to see faces in many objects because humans have a strong _____ for faces.

Illusions

WHAT'S THE POINT?

7-5 How can the principles of perception explain illusions?

- Many illusions rely on the principles of perception—including Gestalt principles, perceptual sets, and ambiguous size-distance cues—to trick us into misperceiving sensory stimuli.

Apply What You Know

9. The _____ illusion causes us to misjudge the length of lines.
10. The distorted _____ room causes the viewer to misjudge size and distance.

KEY TERMS

perception, p. 118
gestalt, p. 119
figure-ground, p. 120
grouping, p. 120
depth perception, p. 121
visual cliff, p. 122
binocular cues, p. 122
monocular cues, p. 122
retinal disparity, p. 123
convergence, p. 124
perceptual constancy, p. 128
perceptual set, p. 130
extrasensory perception (ESP), p. 131

Consciousness

MODULES

8 Sleep, Dreams, and Body Rhythms

9 Psychoactive Drugs

10 Hypnosis and Other States of Consciousness

I had been unfairly accused of taking something, although I couldn't really remember what it was. Nobody wanted to hear my side of the story. My friends and family wouldn't listen, and they actually started chasing me in hopes of turning me into the authorities. Presumed guilty instead of innocent, I feared I was going to be arrested, tried, and convicted without any hope of legal assistance. Cornered and frightened, with no place to hide, I thankfully woke up.

The emotions and events of this dream seemed so real that I had a lot of trouble getting back to sleep. There was even a slight moment of pause, after waking, when I had to reassure myself, "That was a dream, right? Yes. Phew!"

Dreaming is merely one of the altered states of consciousness we examine in these three modules. We also look at drug use and addiction, as well as research and beliefs about hypnosis and other states of consciousness.

MODULE 8

Sleep, Dreams, and Body Rhythms

We spend about one-third of our lives in bed, but how much is known about sleep and dreaming? It turns out we know quite a bit, and some of what we know will likely surprise you.

Consciousness

Body Rhythms

Sleep and Sleep Deficit

Why We Sleep

Sleep Stages, REM Sleep, and Dreaming

- Stages of Sleep
- REM Sleep
- Why Do We Dream?

Sleep Disorders and Sleep Problems

- Insomnia
- Sleep Apnea
- Narcolepsy
- Other Sleep Problems

Consciousness

WHAT'S THE POINT?

8-1 What do psychologists mean by consciousness?

Has this ever happened to you? You're watching a movie with friends or family late at night, and no matter how hard you fight it, you simply cannot keep your eyes open. Or perhaps you've waged a similar struggle while reading a textbook (but certainly not your psychology text). You fight it, but soon you nod off—sleep wins again.

BLEND IMAGES/ALAMY

Bored Senseless or Sleep Deprived?

This student has clearly lost any struggle to stay awake.

You don't stand much of a chance in the tiredness battle; virtually every night, sleep wins. And when you do stay up later than you should, the effects are often obvious. The day a 10-page term paper is due, I can easily spot those students who, having waited until the last minute, spent most of the previous night at a keyboard. Fighting the "nods" (heads bobbing downward), they suddenly jerk upright after a brief trip to never-never land.

To nod off is to temporarily lose waking **consciousness,** or awareness of yourself and your environment. Once in sleep's grasp, consciousness ceases as certain parts of the brain's cortex stop sending messages that would otherwise keep you awake (Massimini et al., 2005). Depriving yourself of sleep alters your body's natural rhythms, making it difficult to maintain normal, waking consciousness. Indeed, your body has several naturally occurring rhythms that affect wakefulness and sleep.

PAUSE NOW OR MOVE ON

Turn to page 154 to review and apply what you've learned.

Body Rhythms

WHAT'S THE POINT?

8-2 What are body rhythms, and how do they affect us?

An e-mail's subject line, "Reliably Predict Your Mood for Free," once caught my eye. Closer investigation showed the predictions were anything but reliable—and certainly not free. This advertisement pitched something called a "biorhythm chart," which was a good example of a **pseudoscientific claim**—an assertion that attempts to appear scientific but is not really based on science. The e-mail guaranteed that after I typed in the time and date of my birth, the chart could accurately predict my good and bad days, my illnesses and accidents, and even the best days for me to gamble. (Gullibility level was not predicted.)

Researchers have found that pseudoscientific biorhythm charts are useless (Hines, 1998). Your body does, however, have real **biological rhythms**—periodic physiological fluctuations—that affect body temperature, blood pressure, and the effectiveness of medicines. These biological rhythms fall into three main categories:

1. **Circadian rhythms** are biological rhythms that occur approximately once every 24 hours (*circa* and *dies* in Latin mean "about" and "day," respectively). The sleep-wake cycle is an example of a circadian rhythm.

consciousness Awareness of yourself and your environment.

pseudoscientific claim Any assertion that appears scientific but is not based on science.

biological rhythms Periodic physiological fluctuations.

circadian [ser-KAY-dee-un] rhythms Biological rhythms (for example, of temperature and wakefulness) that occur approximately every 24 hours.

2. **Ultradian rhythms** are biological rhythms that occur more than once a day. The most studied ultradian rhythm is the way we cycle through various stages of sleep each night. (You'll read more about these sleep stages shortly.)
3. **Infradian rhythms** are biological rhythms that occur once a month or once a season. Examples include a woman's monthly menstrual cycle and a bear's winter hibernation (once a season).

ultradian [ul-TRAY-dee-un] rhythms Biological rhythms that occur more than once each day.

infradian [in-FRAY-dee-un] rhythms Biological rhythms that occur once a month or once a season.

We are aware of some of these biological rhythms as we cycle through them, but most run on autopilot, rarely generating a thought. An understanding of your body's natural rhythms may help you get more out of your day—and night.

PAUSE NOW OR MOVE ON

Turn to page 155 to review and apply what you've learned.

Sleep and Sleep Deficit

WHAT'S THE POINT?

8-3 What happens to your body when you don't get enough sleep?

Live to be 90, and you will have spent roughly 30 years of your life with your eyes closed, mostly oblivious to your surroundings. Ironically, few of us know much about the gentle tyrant that drives us to bed each night (Webb, 1992). While adults in the United States average around 8 hours of sleep, most students get below-average sleep (National Sleep Foundation, 2008; Robinson & Martin, 2007). The research on sleep deprivation shows that not getting enough sleep is bad for you:

- Lack of sleep decreases the levels of hormones necessary for proper immune system functioning. Sleep deprivation also increases levels of the stress hormone cortisol, which has been linked to the damage of brain cells responsible for learning and memory (Leproult et al., 1997).

© INSADCO PHOTOGRAPHY/ALAMY

A More Likely Cause of Accidents

Lack of sleep is a greater cause of accidental death than drunk driving for truck drivers (National Transportation Safety Board, 1995).

- Adults with less sleep than normal are typically fatter than those who get the sleep they need (Schoenborn & Adams, 2008). In fact, sleep deprivation increases appetite and eating (Nixon et al., 2008).
- Citing the number of road deaths related to truck drivers and others who fall asleep while driving, the National Transportation Safety Board (1995) considers driver fatigue a bigger safety problem than alcohol use. **Figure 8.1,** which dramatically illustrates the effect of 1 hour of lost sleep, supports this position.
- Sleep debt contributes to hypertension, impaired concentration, irritability, suppression of cancer-fighting immune cells, and premature aging (Dement, 1999; Motivala & Irwin, 2007; Spiegel et al., 1999).

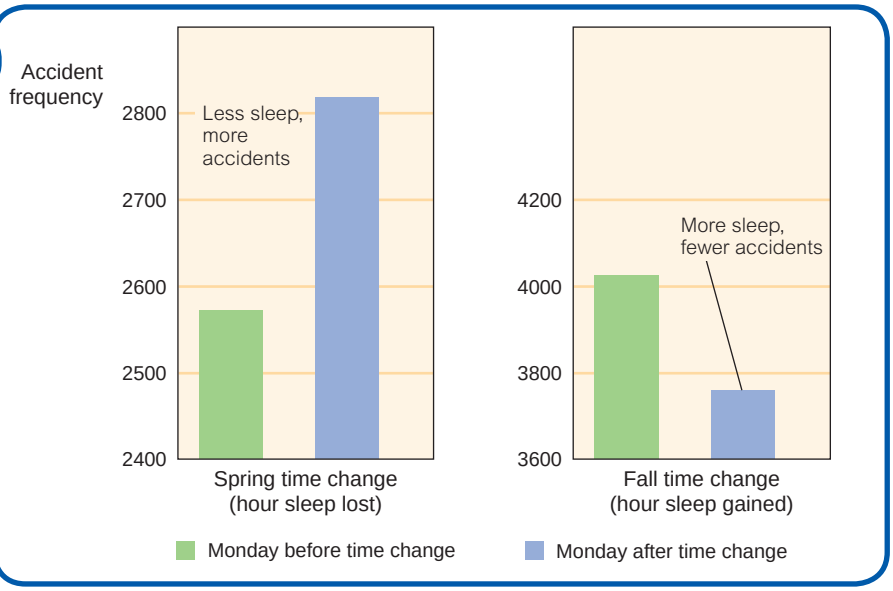
With the evidence mounting against late nights, you'd think that a movement toward turning lights out earlier would gain momentum. Wrong. Teenagers are getting almost 2 hours less sleep now than they did 70 years ago, before the days of all-night drive-throughs, the Internet, and late-night TV channels (Maas, 1998). Four out of five students are "dangerously sleep deprived," according to sleep researcher **William Dement** (1999). Dement states, "The brain keeps an accurate count of sleep debt" (p. 64), which helps explain why many high school students sleep effortlessly until noon on weekends if allowed. He matter-of-factly adds that, given the damage a lack of rest inflicts on your brain, a large sleep debt "makes you stupid." Are you getting the sleep you need? To find out, answer the questions in Psychology in the Real World: Are You Sleep Deprived? Most teens need 9 hours of sleep each night, and 80 percent of all teens in the United States wish they slept more on school nights (Mason, 2005). If you need an alarm to interrupt the sleep your body still wants, you're not getting enough.

PETER MENZEL/PHOTO RESEARCHERS, INC.

WILLIAM DEMENT (1928–) Sleep researcher who coined the term *rapid eye movement (REM).*

Figure 8.1
Spring Forward, Fall Back?

Compare the frequency of accidents on the Mondays before and after we lose an hour to daylight saving time in the spring. In the fall, the opposite trend appears. (From National Transportation Safety Board, 1995.)



PAUSE NOW OR MOVE ON

Turn to page 155 to review and apply what you've learned.

Psychology in THE REAL WORLD

Are You Sleep Deprived?

Cornell University psychologist James Maas reports that most college students suffer the consequences of sleeping less than they should. To see if you are headed toward being in that group, answer the following true-false questions:

True	False	
_____	_____	1. I often need an alarm clock in order to wake up at the appropriate time.
_____	_____	2. It's often a struggle for me to get out of bed in the morning.
_____	_____	3. Weekday mornings I often hit the snooze bar several times.
_____	_____	4. I often feel tired and stressed out during the week.
_____	_____	5. I often feel moody and irritable; little things upset me.
_____	_____	6. I often have trouble concentrating and remembering.
_____	_____	7. I often feel slow with critical thinking, problem solving, and being creative.
_____	_____	8. I need caffeine to get going in the morning or make it through the afternoon.
_____	_____	9. I often wake up craving junk food, sugars, and carbohydrates.
_____	_____	10. I often fall asleep watching TV.
_____	_____	11. I often fall asleep in boring meetings or lectures or in warm rooms.
_____	_____	12. I often fall asleep after heavy meals.
_____	_____	13. I often fall asleep while relaxing after dinner.
_____	_____	14. I often fall asleep within five minutes of getting into bed.
_____	_____	15. I often feel drowsy while driving.
_____	_____	16. I often sleep extra hours on the weekends.
_____	_____	17. I often need a nap to get through the day.
_____	_____	18. I have dark circles around my eyes.
_____	_____	19. I fall asleep easily when watching a movie.
_____	_____	20. I rely on energy drinks or over-the-counter medications to keep me awake.

If you answered *True* to four or more items, consider yourself seriously sleep deprived. To determine your sleep needs, Maas recommends that you "go to bed 15 minutes earlier than usual every night for the next week—and continue this practice by adding 15 more minutes each week—until you awaken without an alarm clock and feel alert all day." (Maas Robbins Alertness Questionnaire [MRAQ] adapted with permission from Maas & Robbins, 2010.)

Why We Sleep

WHAT'S THE POINT?

8-4 How do we benefit from sleeping?

What causes us to sleep? Over one hundred years ago, Russian physiologist Ivan Pavlov believed sleep resulted from what he called "massive inhibition." Others suggested that neurons disconnected from one another, causing us to "drift off." Although we have come a long way technologically since the days of Pavlov, we still have no complete answer to the question of why we sleep.

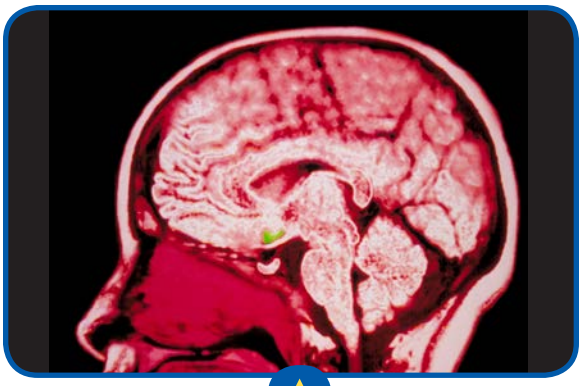


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Figure 8.2
Sleep Command Center

The hypothalamus, colored green in this MRI brain scan photograph, sends messages to other parts of the brain saying, "Time to sleep."

But scientists have gathered some partial answers by looking at the brain and nervous system.

The control center for the 24-hour rhythm of sleep appears to be the brain's hypothalamus (see **Figure 8.2**). You have a sort of sensor in your hypothalamus that monitors changes in light and dark. Perceiving key changes in light level, your hypothalamus sends neurological messages to parts of your brain and body, initiating the changes that will cause consciousness to fade and put you to sleep (Massimini et al., 2005). These physiological changes often involve the increase or decrease of hormones (chemical messengers) in your bloodstream.

One such hormone, **melatonin,** helps regulate the sleep-wake cycle (Haimov & Lavie, 1996). Wake up in the morning and turn on the light or open the curtains, and the melatonin levels that built up while you slept will start to drop. Your melatonin levels will continue to drop until the next time you turn out the lights, close your eyes, and go to sleep. Some people with insomnia respond favorably to medically controlled amounts of melatonin supplements.

So, we know something about *how* we go to sleep, but *why* do we need to sleep? Why can't we simply stay up, day after day, doing the things we want to do? Two possible answers to these questions revolve around the concepts of preservation and restoration.

If you've ever walked through your home in the dark without turning on lights and crashed into something, you can understand how sleep might help keep us safe. Such nighttime crashes must have been even more common for our ancestors, who lived in caves and on cliffs. Traveling or hunting at night (well before the invention of the flashlight!) was treacherous, and perhaps those who attempted it did not survive long enough to reproduce and pass along their genes. Sleep provides *protection* from nighttime's dangers, at least for daytime mammals like us. The sleep cycles of other animals have adapted in different ways, depending on such factors as ability to hide and the need for nourishment (Webb, 1992). Bats, for example, sleep 20 hours a day. Cats sleep 14 hours, but elephants drift off for only 3 to 4 hours. The adaptation theory suggests that we sleep at times of the night or day that maximize our safety and survival.

Another prominent theory suggests that sleep is restorative, allowing us to recuperate from the everyday wear and tear we put ourselves through. Though your brain remains active, brain tissue gets repaired and restored while you sleep (Vyazovskiy et al., 2008). We undergo a rebuilding process as tissues are renewed, memories are consolidated, and things learned on the previous day are reorganized.

Getting your sleep also helps you be creative. After struggling with a problem, insightful solutions are more likely found by those who have slept on it than those who stayed awake (Wagner et al., 2004). Sleep helps you "connect the dots" between different pieces of unusual information (Ellenbogen et al., 2007). In essence, sleep helps you be smart.

melatonin Hormone that helps regulate daily biological rhythms.

PAUSE NOW OR MOVE ON

Turn to page 155 to review and apply what you've learned.

Sleep Stages, REM Sleep, and Dreaming

electroencephalograph (EEG) Machine that amplifies and records waves of electrical activity that sweep across the brain's surface; electrodes placed on the scalp measure these waves.

Many people think of sleep and dreaming as virtually identical processes. In fact, your brain, your voluntary muscles, and your eyes are doing very different things while dreaming compared to their actions during the basic stages of sleep.

Stages of Sleep

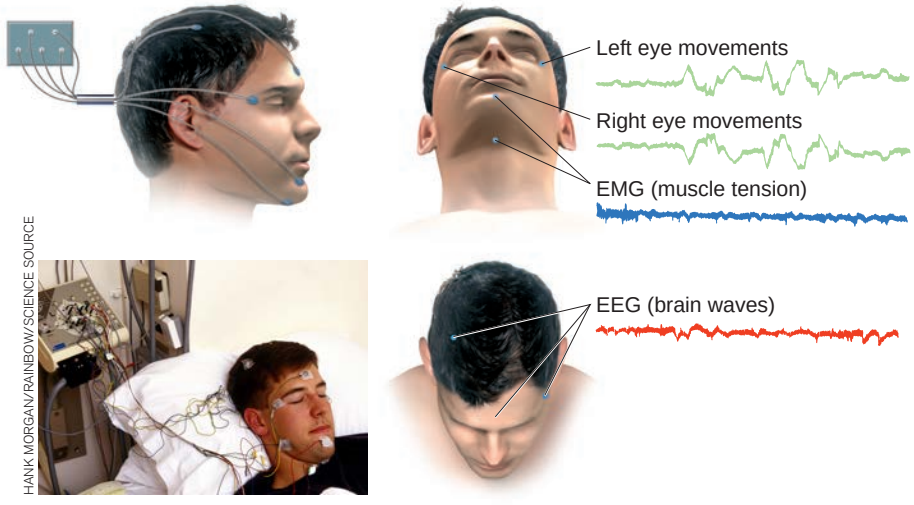
WHAT'S THE POINT?

8-5 What stages do we go through when we sleep?

The sleep-wake cycle itself is circadian, but we also have a 90-minute *ultradian* rhythm cycling throughout our night's sleep. During the 90-minute ultradian cycle, two types of sleep occur in a series of regular, repeating stages. How do we know this? Because sleep researchers have measured the brain waves, eye movements, and muscle tension of sleeping people. The challenges in gathering sleep data are twofold:

1. The person whom you're studying must be asleep.
2. The person must also agree to have a minimum of five electrodes attached to his or her head (see **Figure 8.3**). The electrodes, which are connected to an **electroencephalograph (EEG),** are collecting brain-wave measurements (not delivering shocks!), so the procedure is painless.

Fortunately, thousands of volunteers have agreed to sleep under observation with electrodes on. Would you volunteer to be a participant in a sleep study? For a few minutes, let's suppose you would. Here's what would happen.



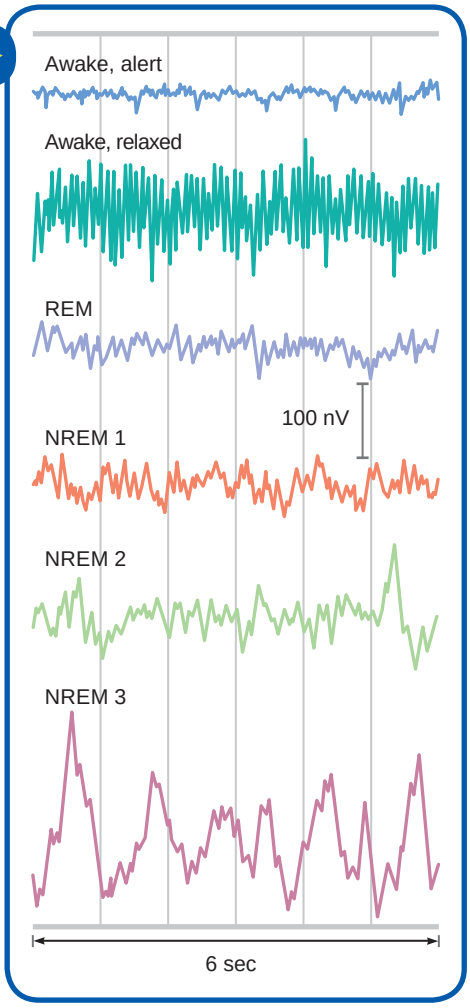
HANK MORGAN/RAINBOW/SCIENCE SOURCE

Figure 8.3
Measuring Sleep

Sleep researchers use electrodes to measure brain waves (using an electroencephalograph, or EEG), eye movements, and muscle tension (using an electromyograph, or EMG) while we sleep. They can use the changes in these measurements to label the different stages of sleep and dreaming.

Figure 8.4
Brain Waves and Sleep Stages

Brain waves slow as we cycle into the deeper stages of sleep.



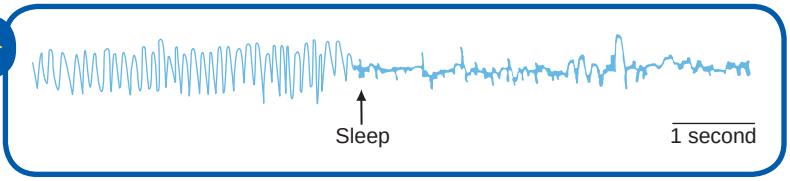
As you try to relax, drifting from wakefulness to sleep, your brain waves cycle more and more slowly. You might yawn, which speeds up heart rate in an attempt to move you toward alertness, but it's a losing battle (Moorcroft, 2003). As you nod off for the benefit of science, you will cycle through three stages of relatively quiet sleep, all referred to as stages of *non–rapid eye movement sleep*, before you go into a more active dreaming state (see **Figure 8.4**). You will not be able to tell the exact moment you enter *NREM 1* (or non–rapid eye movement stage 1), but a sleep researcher, noticing your slowed breathing and irregular brain waves, could accurately point to these first moments of sleep, which rarely last longer than 5 minutes (see **Figure 8.5**). It would be easy to awaken you from this stage, and if the sleep researcher did, you'd probably insist you had not been sleeping.

But let's imagine that the researcher did not awaken you. As you exit NREM 1, your brain waves cycle more slowly and you slide into the deeper sleep of *NREM 2*. The first time you enter NREM 2, your stay lasts 20 minutes. Over the course of the night, you will spend up to half of your entire time asleep in this stage.

About 30 minutes after you fall asleep, your brain waves begin to slow way down as you drop into *NREM 3*. This is a stage called *slow-wave sleep*. Your brain waves slow to less than 1 cycle per second in NREM 3, compared with the 15 or so cycles per second you experienced just after you closed your eyes. The first time you travel through this ultradian cycle, the rejuvenating sleep of NREM 3 will last about 30 minutes.

Figure 8.5
Entering the Land of Nod

You wouldn't be able to say precisely when you fell asleep last night, but a sleep researcher charting your brain waves could pinpoint the time accurately. (From Dement, 1999.)



PAUSE NOW OR MOVE ON

Turn to page 155 to review and apply what you've learned.

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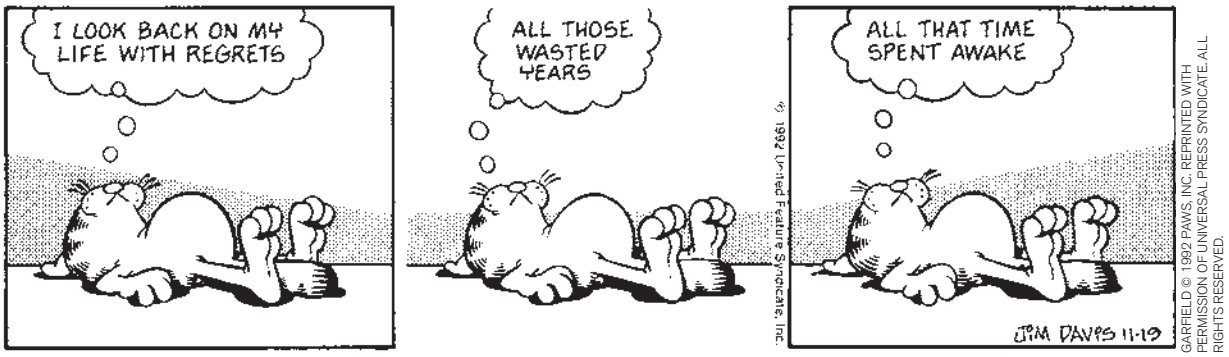
I LOOK BACK ON MY LIFE WITH REGRETS
ALL THOSE WASTED YEARS
ALL THAT TIME SPENT AWAKE
JIM DAVIS 11-13
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REM Sleep

rapid eye movement (REM) sleep Recurring sleep stage during which vivid dreams commonly occur.

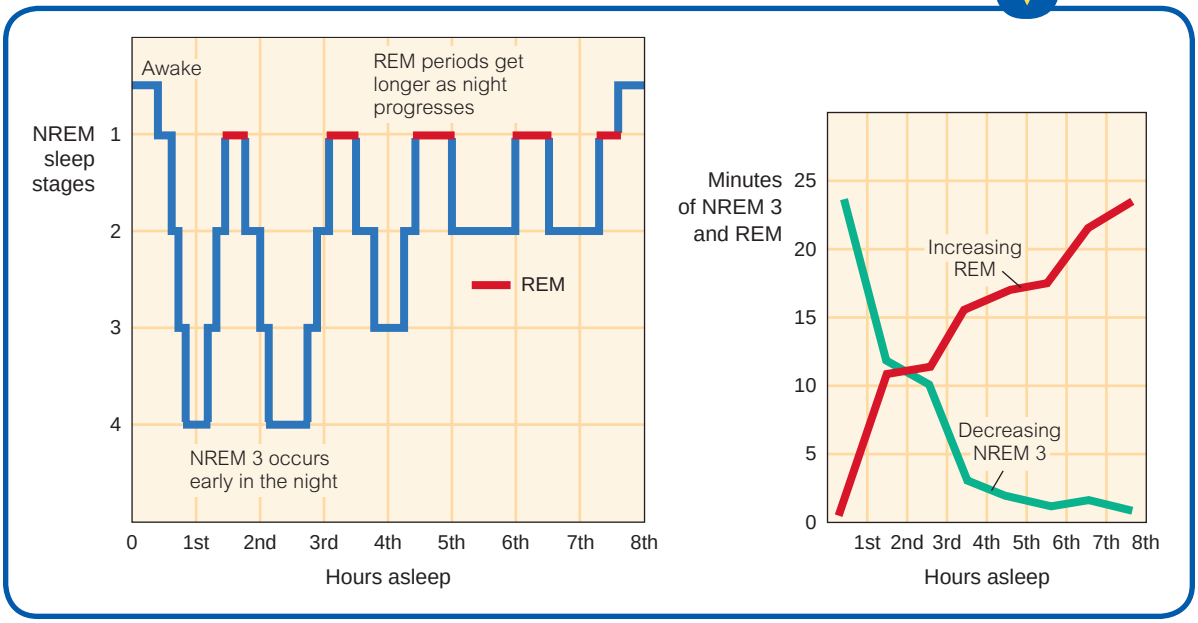
WHAT'S THE POINT?

8-6 Why is REM sleep described as paradoxical?

Up to this point, you've been cycling down through the three stages of *non–rapid eye movement sleep,* or NREM sleep. After you reach NREM 3, your brain waves will begin to pick up a little speed and strength. You will move back up through NREM 2 and 1, and then you will enter your first period of rapid eye movement sleep, or **REM sleep,** a recurring sleep stage during which your eyes move rapidly under your closed lids and you dream vividly. Your initial REM period will not last long, and after it ends, the cycle will start again from NREM 1. This 90-minute ultradian rhythm continues all night, although NREM 3 drops out of the cycle after the second or third time through. The last 4 hours of sleep, assuming you get the 8 to 9 hours you're supposed to, are pretty much spent alternating between NREM 2 and REM (see **Figure 8.6**).

Figure 8.6
A Good Night's Sleep

We cycle through sleep stages all night. The graph on the left shows that as we sleep we cycle down into deeper stages of sleep and back up, where we enter REM sleep. The graph on the right shows how REM sleep increases as the night wears on. (From Cartwright, 1978; Webb, 1992.)



During REM sleep, your brain patterns most closely resemble those of NREM 1 sleep. Looks can be deceiving, however, because REM sleep is actually quite different from the other sleep stages. During REM, your eyes dart about under closed eyelids, your pulse quickens, and your breathing becomes faster and irregular. Blood flows into the genitals at a rate faster than it can be removed (which can result in morning erections in males that are unrelated to actual dream content). But despite all this internal activity, the electrode measuring muscle tension in your chin would show a flat line on the EEG because you are, in essence, temporarily paralyzed during REM sleep. Your brainstem blocks messages from your motor cortex, the brain structure that controls your movements.

REM sleep is sometimes called *paradoxical* sleep because of its contrasting nature. During REM, you have active brain waves, you are processing input from your environment (for example, you might incorporate external noises into your dreaming), and you can be awakened more easily than at any other sleep stage. Yet you are still definitely asleep.

What's going on in our brains to produce all that internal activity? We're dreaming. More than 80 percent of people awakened during REM sleep report that the wake-up call interrupted a dream. REM sleep consumes about 25 percent of your nightly sleep, which means that you spend 100 minutes each night dreaming, whether you remember a second of it or not. This holds true for everyone. We *all* dream every night of our lives.

PAUSE NOW OR MOVE ON

Turn to page 156 to review and apply what you've learned.

Why Do We Dream?

WHAT'S THE POINT?

8-7 What are the four modern explanations for why we dream?

There are several theories of why we dream. Sigmund Freud contributed psychology's earliest dream theory. In his book *The Interpretation of Dreams,* published more than a century ago, Freud wrote that dreams were the key to understanding our inner conflicts. He believed that dreams were expressions of wish fulfillment and that analysis could trace most dreams back to erotic wishes (Freud, 1900). Modern theories of dreaming offer at least four more plausible explanations—information processing, physiological function, activation synthesis, and cognitive development:

1. *Information processing*—Dreams serve an important memory-related function by sifting through the day's experiences and tying up loose ends. In other words, think of your brain as a computer that loses its Internet connection when it first goes to sleep but then comes back online during REM sleep to sort through some of the previous day's activities. Research shows that REM sleep facilitates memory storage,

and the amount of REM sleep increases following stressful times (McGrath & Cohen, 1978; Palumbo, 1978).

2. *Physiological function*—Neural activity during REM sleep provides periodic stimulation for our brains. Infants, whose brains are developing at a fantastic rate, spend significantly more time than their adult counterparts do in REM sleep (see **Figure 8.7**). The discovery that the pituitary gland secretes a growth hormone *during* NREM 3 supports this theory. Weren't we always told as young children, "If you don't get your sleep, it will stunt your growth"? The growth hormone secreted while we sleep suggests we should have listened to this advice.
3. *Activation synthesis*—Rather than ascribing any physiological or memory-related status to dreams, this activation-synthesis theory suggests that dreams are simply the mind's attempt to make sense out of random neural firing in the various regions of the "sleeping" brain. That is, the brain's attempt to interpret random neural activity during sleep is what creates a dream.
4. *Cognitive development*—Some evidence suggests that dreams are simply a part of the maturation process related to brain development (Domhoff, 2002). That is, the dreams of a third grader are far less dynamic and active and tell less of a story when compared to those of a 20-year-old. Dreams also reflect what we've learned and what we know. If we've never heard of a Native American sweat lodge or the ceremonies that take place inside such a lodge, we're not going to dream about them. Furthermore, some dreams take place outside REM sleep. The dreams outside REM show how parts of the brain that are active during dreaming need not be active for dreams to occur. So, perhaps dreaming is little more than a reflection of normal cognitive development, the same way

MARC CHAGALL, "I AND THE VILLAGE" 1911. OIL ON CANVAS, 6' 3⅝" × 5' 9⅝" (192.1 × 151.4 CM). THE MUSEUM OF MODERN ART, NEW YORK. MRS. SIMON GUGGENHEIM FUND. PHOTOGRAPH © 1997 THE MUSEUM OF MODERN ART, NEW YORK

The Meaning of Dreams?

Marc Chagall's painting *I and the Village* captures what a dream can look like to the dreamer: colorful, confusing, and possibly filled with meaning.

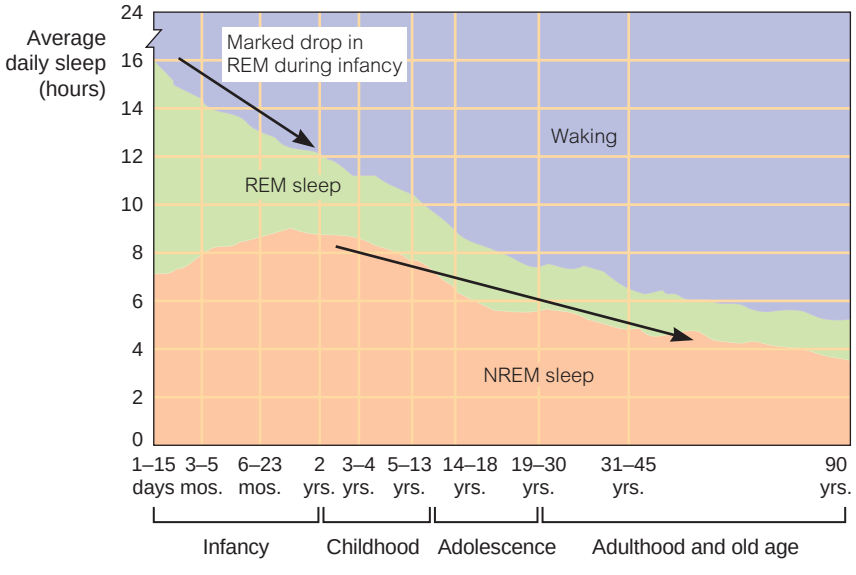


Figure 8.7
Sleep and Age

Sleep patterns change as we grow older. (From Snyder & Snyder, 1972.)

Table 8.1

Dream Theories

Theory	Explanation	Critical Considerations
Information processing	Dreams help us sort out the day's events.	But why do we sometimes dream about things we have not experienced?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This may be true, but it does not explain why we experience *meaningful* dreams.
Activation synthesis	REM sleep triggers neural activity that evokes random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive development	Dream content reflects dreamers' cognitive development—their knowledge and understanding.	This theory does not address the neuroscience of dreams.

daydreams become more complex between the ages of 2 and 20. Dream researchers adopting this theory are likely to sharply disagree with both Freudian and activation-synthesis supporters (see **Table 8.1**).

We are not the only animals who experience REM sleep. We don't know whether other animals are having dreams, but nearly all animals, from sheep to walruses, show measurable REM periods while hooked up to an EEG during sleep. (Just how do they keep electrodes on walruses?) Such evidence suggests a biological *need* for REM sleep. We do know that people don't feel rested unless their sleep has contained REM periods. Also, when finally allowed to sleep after a period of sleep deprivation, we tend to dive straight into REM sleep rather than following the normal cycle. Furthermore, REM does not occur in fish, whose behavior (unlike mammals) is governed more by instinct and less by learning, supporting the information-processing model of why we dream. The truth behind dreams, once discovered, will surely encompass both psychological and biological explanations.

Cat Nap

The cat in NREM sleep (left) is sleeping comfortably. On entering REM sleep, the cat's brain stops sending the signals to the muscles that let the cat hold its head off the floor.

BARBARA A. BARROWS

PAUSE NOW OR MOVE ON

Turn to page 156 to review and apply what you've learned.

Sleep Disorders and Sleep Problems

insomnia Recurring problems in falling asleep or staying asleep.

sleep apnea Sleep disorder characterized by temporary cessations of breathing during sleep and consequent momentary reawakenings.

WHAT'S THE POINT?

8-8 What are sleep disorders, and how do they interfere with our sleep cycles?

Not everyone follows the normal sleep patterns we've been discussing. Some people experience serious sleep disruptions or problems related to sleep, such as insomnia, sleep apnea, and narcolepsy.

Insomnia

Who among us has never spent a restless night, tossing and turning, unable to get the sleep we so desperately desire? Thoughts of taking an important exam, anticipation of a special trip, or distress brought on by concern for a loved one all carry the potential to block the sleep we'd like to have. Happily, difficulty in getting to sleep is a rare event for most of us. Those less fortunate suffer from **insomnia,** recurring problems in falling asleep or staying asleep. For those with insomnia, getting to sleep or remaining asleep can be a real nightmare.

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Actually, my species is not nocturnal: I'm just a teenager . . .

Oral medications for insomnia may actually worsen the problem. Sleeping pills, with sales increasing over 60 percent since the start of the twenty-first century, can be addictive, and they inhibit or suppress REM sleep, leaving the sleep-hungry person feeling even worse than before (Saul, 2007). Alcohol also suppresses REM sleep: Those who have a drink at bedtime to help get to sleep will find the cure to be worse than the disease.

Stanley Coren's (1996) research sheds some interesting light on insomnia. After collecting EEG data from those who complained about insomnia and those who did not, he asked both groups to estimate how long it took to get to sleep. Insomnia complainers estimated that it took them twice as long to get to sleep as it actually did. Furthermore, they dramatically miscalculated the amount of time they slept, estimating they'd slept half the time they actually had. Perhaps we should keep this research in mind the next time we think we haven't slept much the night before. It's a lot easier to remember, and exaggerate, the times during the night when we were awake than the times we were asleep. (In addition, see Thinking About Positive Psychology: Increasing the Quality of Your Sleep for sleep tips.)

Sleep Apnea

Losing one night's sleep may not cause significant damage, but **sleep apnea**—a disorder characterized by repeated awakenings throughout the night as a result of not being able to breathe—can leave you exhausted. A person with sleep apnea is a loud snorer who stops breathing at the peak of a heavy, inhaled snore, and whose breathing may cease for as long as a minute. The only way the person can breathe again is to briefly awaken, which may happen more

Thinking About POSITIVE PSYCHOLOGY

Increasing the Quality of Your Sleep

Do you have trouble falling asleep? Do you often wake up during the night? If so, don't sweat it. There are several steps you can take to improve the quality of your sleep while reducing the anxiety you might experience when sleep does not come easily. Consider the following:

- Do not consume caffeinated beverages or foods after 3:00 P.M. Skip that soda with dinner, and turn away from late-night chocolate snacks.
- Exercise daily, but avoid late-night runs.
- Drink milk, which aids in the production of a chemical (serotonin) in your body that promotes sleep.
- Dim the lights at night, and relax before bedtime.
- Accept that as a human being, you experience stress. Conflict during the day might naturally lead to a crummy night's sleep.
- Get up at the same time every morning. Sleeping late on weekends can make it difficult to get to sleep on Sunday night, leaving you extra tired on Monday morning. Naps can have the same effect: You may not be able to fall asleep at your normal bedtime.
- Avoid nighttime activities that rile you up. Angry text messages, action-packed video games, or emotional arguments right before attempting to sleep are not good ideas.
- Try not to worry when you can't get to sleep. Remember that it's normal to take 15 minutes or more to fall asleep at night. Besides, sleeping poorly for one night won't cause any great harm, and often you'll be able to sleep better the following night.

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than 400 times a night. Apnea (meaning "with no breath") sufferers (usually overweight males) experience dreadful sleepiness even after a full night's sleep, but they may be unaware they are having such poor-quality sleep.

Some of you are probably thinking, "My dad is heavy and snores like a freight train. Does he have sleep apnea?" I'm not going to advise you to play sleep diagnostician, but if you have a relative or friend who fits this profile, you might want to find out a little more about sleep apnea and perhaps even suggest that the person be checked for this disorder. Roughly 5 percent of Americans (millions of people) suffer from sleep apnea. The most common treatment involves use of a continuous positive airway pressure (CPAP) machine, which helps the person breathe during the night.

M. FISHER/CUSTOM MEDICAL STOCK PHOTO

Sleeping Aid

Those with sleep apnea can turn to this continuous positive airway pressure, or CPAP, machine (and others like it) to help them get the sleep they need.

Narcolepsy

narcolepsy Sleep disorder characterized by uncontrollable sleep attacks; the sufferer may lapse directly into REM sleep, often at inopportune times.

somnambulism Sleepwalking, which usually starts in the deeper stages of NREM sleep; the sleepwalker can walk and talk and is able to see but rarely has any memory of the event.

night terrors Sleep-related problem characterized by high arousal and an appearance of being terrified; unlike nightmares, they occur during NREM 3 sleep, occur within two or three hours of falling asleep, and are seldom remembered.

Can you imagine what it would be like to suddenly fall asleep because something made you laugh, cry, or feel infuriated? Such is the life of a person with **narcolepsy** (*narco* meaning "numbness," *lepsy* meaning "seizure"), a sleep disorder characterized by uncontrollable sleep attacks. Narcolepsy is a rare disease (striking 1 in 2000 people) that runs in families. Those with narcolepsy experience sleep attacks when their nervous systems become aroused, often from a strong emotion (Dement, 1978). When an attack occurs, they fall immediately into REM sleep, often at the most inopportune or dangerous times. Imagine the horror of being cut off in traffic, becoming angry at the other driver, and then instantly lapsing into sleep.

In recent years, researchers have isolated a narcolepsy-causing gene in dogs and have linked narcolepsy to the absence of the neurotransmitter hypocretin (Taheri, 2004; Taheri et al., 2002). Both of these developments raise hope for the development of a lasting treatment that would, in essence, cure narcolepsy. Until then, physicians will continue to treat narcolepsy with a form of REM-inhibiting stimulant. If you don't have narcolepsy now, chances are you never will; the onset of this disorder accompanies puberty.

Other Sleep Problems

Other sleep-related problems don't qualify as sleep disorders, but they can be disruptive nonetheless. The first four on this list typically occur during sleep in NREM 3:

- **Somnambulism** is sleepwalking. Is it dangerous to awaken a sleepwalker? *No,* but it is indeed difficult to awaken someone who is walking around with brain waves revving at 1 cycle per second. Is the sleepwalker acting out a dream? Again, *no.* Remember, most dreams occur during REM sleep, and during that type of sleep, we lose our ability to move around.
- **Night terrors** are characterized by high arousal and every indication of being terrified. Night terrors most often afflict children, who look

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"Wait! Don't! It can be dangerous to wake them!"

Danger?

Although it may be difficult, awakening this sleepwalker would definitely be the right decision.

like they are awake and terrified even though they are sound asleep. The child rarely has any memory of the event when told about it in the morning. Night terrors are different from nightmares, which are dreams (so they occur during REM sleep). Night terrors occur within a few hours of falling asleep, during NREM 3 sleep.

- *Bruxism* is teeth grinding that sounds as though two bricks are being rubbed together. Adults with this problem often wear some kind of tooth guard to keep from wearing away enamel.
- *Enuresis* is bed wetting.
- *Myoclonus* is a sudden jerking of a body part that occurs in NREM 1 or 2. Everyone experiences myoclonus now and then, but acute cases can result in daytime symptoms similar to those accompanying sleep apnea.

Some people appear to get by on as few as 4 hours of sleep per night. However, most of these brief sleepers experience negative effects on their bodies, such as memory loss and premature aging, that we cannot immediately see. So, when you're tired and it's time to sleep, pay attention to your body. Ignore that last text message, resist the urge to keep updating your Facebook profile after it gets late at night, and give in to the gentle tyrant that is your need for sleep.

PAUSE NOW OR MOVE ON

Turn to page 156 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 8

Thinking About Sleep, Dreams, and Body Rhythms

Consciousness

WHAT'S THE POINT?

8-1 What do psychologists mean by consciousness?

- Consciousness is the degree to which we are aware of our environment and ourselves.

Apply What You Know

1. The psychological definition of consciousness involves
   a. any state that does not involve unconsciousness.
   b. ultradian and infradian rhythms.
   c. a waking state in which we are aware of most sensations.
   d. awareness of our inner and outer experiences.
2. When you fall asleep,
   a. you immediately begin to dream.
   b. your brain stops sending messages that keep you awake.
   c. your brain stops sending messages that keep you asleep.
   d. your body enters a paralyzed state.

Body Rhythms

WHAT'S THE POINT?

8-2 What are body rhythms, and how do they affect us?

- We go through three types of body rhythms that occur in regular cycles—circadian, ultradian, and infradian—and that affect our consciousness and physiological processes.

Apply What You Know

3. The migration of monarch butterflies from the United States to Mexico that occurs every year is an example of
   a. an ultradian rhythm.
   b. a circadian rhythm.
   c. an infradian rhythm.
   d. a pseudoscientific rhythm.
4. Biological rhythms (for example, of temperature and wakefulness) that occur approximately every 24 hours are called _____ rhythms.

Sleep and Sleep Deficit

WHAT'S THE POINT?

8-3 What happens to your body when you don't get enough sleep?

- Sleep deprivation causes physiological changes that can dramatically affect our moods, health, and ability to perform physically and mentally.

Apply What You Know

5. Lack of sleep interferes with our health and ability to concentrate mainly because
   a. levels of necessary hormones decrease, affecting our immune system and brain operations.
   b. we are conditioned to sleep in infancy.
   c. dreaming is necessary to emotionally process significant events of the day.
   d. a lack of sleep causes us to cycle through various stages of sleep, causing tiredness.
6. True or False: Sleep deprivation can lead to increased appetite and obesity.

Why We Sleep

WHAT'S THE POINT?

8-4 How do we benefit from sleeping?

- Sleep helps restore our bodies physically and protect us from nighttime hazards.

Apply What You Know

7. True or False: "Sleeping on it" might actually help you solve a problem you'd been working on the night before.
8. Psychologists think we sleep for
   a. protective and restorative reasons.
   b. ultradian and infradian reasons.
   c. rapid eye movement (REM) and non–rapid eye movement (NREM) reasons.
   d. conscious and unconscious reasons.

Sleep Stages, REM Sleep, and Dreaming

Stages of Sleep

WHAT'S THE POINT?

8-5 What stages do we go through when we sleep?

- We cycle through three stages of non–rapid eye movement (NREM) sleep every night.
- The stages of sleep describe different levels of brain activity, measured by brain waves.

Apply What You Know

9. A sleep researcher looking at a computer printout of brain waves sees a pattern of long, slow waves (one per second). Which stage is the sleeper in?
   a. NREM 2
   b. REM sleep
   c. NREM 1
   d. NREM 3
10. Which of the following best describes our sleep cycles?
    a. Deep sleep is interrupted by bursts of activity called NREM sleep.
    b. We cycle through three stages of increasing and decreasing levels of brain activity.

c. Light sleepers spend all night with high levels of brain activity, and deep sleepers spend all night with low levels.
d. After we fall asleep, our brain slows down to save energy, and it speeds up as we begin to awaken in the morning.

REM Sleep

WHAT'S THE POINT?

8-6 Why is REM sleep described as paradoxical?

- The REM stage of sleep is sometimes called paradoxical because of its contrasting nature. During REM, we have active brain waves, we can process input from our environment, and we can be awakened more easily than at any other sleep stage. Yet we are still definitely asleep.

Apply What You Know

11. True or False: REM brain waves cannot be measured on an electroencephalograph (EEG) like those of the other stages.
12. In REM sleep, your brain waves _____ and you _____ vividly.

Why Do We Dream?

WHAT'S THE POINT?

8-7 What are the four modern explanations for why we dream?

- The four modern explanations of dreams focus on how dreams may be related to information processing, physiological function, activation synthesis, and cognitive development.

Apply What You Know

13. Which of the following dream theories is considered a modern explanation of dreams?
    a. symbolic interpretations of repressed memories
    b. Freudian dream analysis
    c. random neural firing
    d. precognition and clairvoyance
14. True or False: Walruses do not experience REM sleep.

Sleep Disorders and Sleep Problems

WHAT'S THE POINT?

8-8 What are sleep disorders, and how do they interfere with our sleep cycles?

- Sleep disorders interfere with our sleep cycles and can affect us mentally and physically during our waking life.
- Insomnia is the most common sleep disorder, but it is treatable.
- Apnea and narcolepsy (less common) are two serious sleep disorders.

Apply What You Know

15. A friend tells you her father is obese and snores loudly at night. Which of the following sleep disorders might you discuss with your friend?
    a. sleep apnea
    b. enuresis
    c. narcolepsy
    d. bruxism
16. Recurring problems in falling asleep or staying asleep are characteristic of _____.

KEY TERMS AND KEY PEOPLE

consciousness, p. 140
pseudoscientific claim, p. 140
biological rhythms, p. 140
circadian [ser-KAY-dee-un] rhythms, p. 140
ultradian [ul-TRAY-dee-un] rhythms, p. 141
infradian [in-FRAY-dee-un] rhythms, p. 141
melatonin, p. 144
electroencephalograph (EEG), p. 145
rapid eye movement (REM) sleep, p. 147
insomnia, p. 151
sleep apnea, p. 151
narcolepsy, p. 153
somnambulism, p. 153
night terrors, p. 153
William Dement (1928–), p. 142

MODULE 9

Psychoactive Drugs

Many people drink coffee in the morning to "get going." The chemical in coffee that achieves this effect is actually a psychoactive drug. Surprised? Let's take a close look at psychoactive drugs and how they affect us.

What Are Psychoactive Drugs?

Alcohol: A Depressant

Stimulants

- Caffeine
- Nicotine
- Cocaine
- Amphetamines
- Ecstasy

Hallucinogens

- LSD

Marijuana

Prevention

What Are Psychoactive Drugs?

WHAT'S THE POINT?

9-1 What are psychoactive drugs, and what is dependence?

Most adults and young adults in this country regularly take **psychoactive drugs,** chemical substances that alter mood, behavior, or perceptions. Surprised? If so, perhaps you don't associate the phrase "psychoactive drug" with the three most commonly used psychoactive substances: caffeine, alcohol, and nicotine. These everyday chemical substances are drugs; as such, they can induce an altered state of consciousness. They also can lead to **dependence**—a state of physiological or psychological need (or combined

psychoactive drug Chemical substance that alters perceptions, mood, or behavior.

dependence State of physiological or psychological need (or combined need) to take more of a drug after continued use.

withdrawal Discomfort and distress that follow when a person who is dependent on a drug discontinues the use of that drug.

tolerance Reduced responsiveness to a drug, prompting the user to take larger doses to achieve the same pleasurable effects previously obtained by smaller doses.

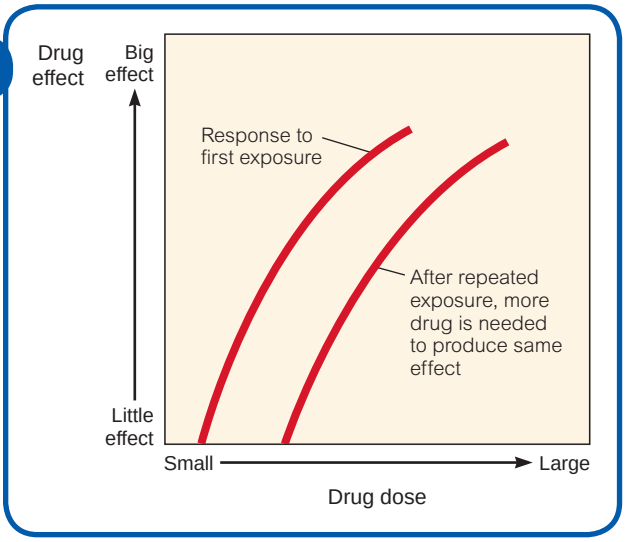
need) to take more of a drug after continued use. Notice that we say *dependence,* not *addiction.* While the World Health Organization reports that over 90 million people suffer from drug and alcohol dependence (2008b), the concept of addiction has lost much of its meaning. Addicted to love? Addicted to television? Addicted to popcorn? Addicted to Twitter? True addictions seriously disrupt a person's ability to function in everyday life. Gambling and Internet use (online games and social networking) can fit this description, but few other behaviors do (Hoeft et al., 2008). For the purposes of this module, we use the term *dependence* instead of *addiction* to discuss psychoactive drugs.

When users are deprived of a drug they are dependent on, they have symptoms of **withdrawal** (usually discomfort and distress). You may experience withdrawal if you normally drink a few cans of caffeinated cola daily and then go on a weekend camping trip where no soda is available. If you experience grogginess, develop a headache, and "miss" your cola, you are demonstrating caffeine dependence.

Withdrawal symptoms often resemble the opposite of a psychoactive drug's intended effect. For a heroin user, this means that the brief, drug-induced episodes of euphoria, relaxation, and slowed breathing will give way to prolonged depression, restlessness, and abnormally rapid breathing after the drug wears off (Feldman et al., 1997). Withdrawal is even worse in those with a long history of drug use. Regular drug use usually leads to **tolerance,** a reduced response to the drug, which prompts the user to take larger doses to achieve the same pleasurable effects previously obtained by smaller doses (see **Figure 9.1**). So, for example, a new drinker may get a "buzz" from one beer, but after drinking regularly over several weeks, the person will develop a tolerance for alcohol and may require two or three beers to achieve that same feeling. With this increased intake, the person's body must struggle to clean out the increased toxins and cope with the rising blood alcohol level. You'll read more about the effects of alcohol next.

Figure 9.1
Tolerance

The initial effect of a psychoactive drug is not the same as the effect that occurs with repeated use. As the user's body develops tolerance to the drug, increasing amounts are usually needed to achieve the same effect.



AP PHOTO/LAURA RAUCH

Take Me Out to the Ball Game

You wouldn't know it by watching these fans, but alcohol is a central nervous system depressant. Another effect? Lowered inhibitions.

We will study four kinds of psychoactive drugs: depressants, stimulants, hallucinogens, and marijuana. Most discussions of drugs and their effects use these four categories, but the drug-taker's *expectations* and *mood* can cause some drugs to jump outside the boundaries of any one classification. For example, alcohol is a depressant, but it can have a wildly stimulating effect on a drinker who expects to feel stimulated, such as an excited fan celebrating a World Series championship.

PAUSE NOW OR MOVE ON

Turn to page 171 to review and apply what you've learned.

Alcohol: A Depressant

WHAT'S THE POINT?

9-2 What are the physiological and psychological effects of drinking alcohol?

Depressants are drugs that reduce neural activity and slow body functions. Alcohol, one of many depressants, is the second most used psychoactive drug in the world. (Caffeine is the first.) Like any depressant, alcohol slows thinking and impairs physical activity. Alcohol is unique among depressants in that its use is largely recreational: People drink to "unwind," for the taste, or to increase sociability at a party. (Those desires can quickly lead to dependence; see Psychology in the Real World: The Question of Alcoholism.)

depressants Drugs (such as alcohol and sedatives) that reduce neural activity and slow body functions.

Psychology in THE REAL WORLD

The Question of Alcoholism

Half of all beer, wine, and liquor consumed in this country is swallowed by only 10 percent of the population. Many of those included in that 10 percent are alcohol dependent. If you suspect that a family member or friend is dependent on alcohol, you might ask that person to read the questions distributed by the National Institute on Alcohol Abuse and Alcoholism (see **Table 9.1**). Answering *Yes* to any of the questions indicates an alcohol problem of some sort. Answering *Yes* to several of the questions may indicate alcoholism.

Table 9.1

Do You Have an Alcohol Problem?

If you can answer *Yes* to even one of these questions, consider seeking advice about your use of alcohol.

1. Has someone close to you sometimes expressed concern about your drinking?
2. When faced with a problem, do you often turn to alcohol for relief?
3. Are you sometimes unable to meet home or work responsibilities because of drinking?
4. Have you ever required medical attention as a result of drinking?
5. Have you ever experienced a blackout—a total loss of memory while still awake—when drinking?
6. Have you ever come into conflict with the law in connection with your drinking?
7. Have you often failed to keep the promises you have made to yourself about controlling or cutting out your drinking?

Source: National Institute on Alcohol Abuse and Alcoholism

Alcoholic beverages vary widely in the amount of alcohol they contain. Beer is usually between 3.5 and 5 percent alcohol, wine is between 9 and 12 percent, and the hard stuff like whiskey is a whopping 40 percent. One 12-ounce can of beer would have about the same effect as a 4-ounce glass of wine or a 1-ounce shot of hard liquor (see **Figure 9.2**). The average 150-pound man takes about an hour to metabolize the alcohol from one beer. If he drinks more than one beer per hour, his *blood alcohol content (BAC)* quickly increases.

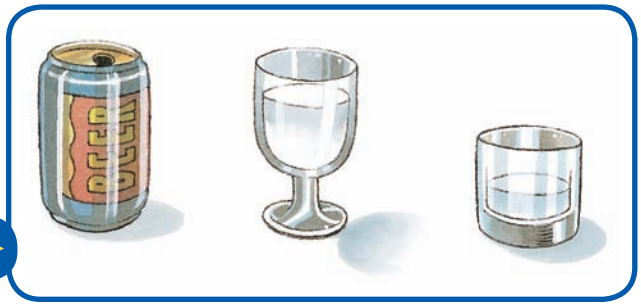


Figure 9.2
What Do We Mean by "One Drink"?

One 12-ounce can of beer has about the same amount of alcohol as a 4-ounce glass of wine or a 1-ounce shot of whiskey.

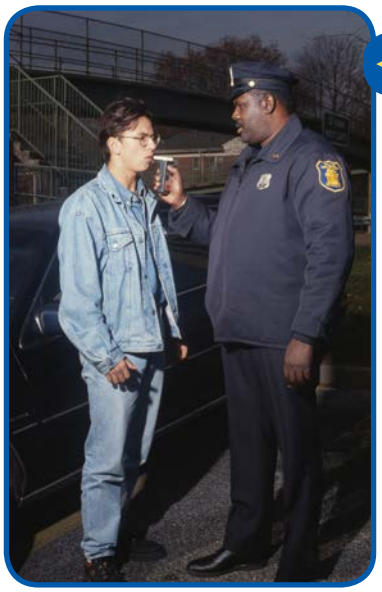
Alcohol also affects women and men differently. Females are more likely to experience liver and brain damage after drinking less extreme amounts than their male counterparts (National Center on Addiction and Substance Abuse, 2003). A man and a woman who both weigh the same and drink the same amount of alcohol will have different amounts of alcohol in their bloodstreams an hour later for at least three reasons (Julien, 2007):

- Men typically have 50 percent more of an enzyme responsible for breaking down (*metabolizing*) alcohol. This means that men rid themselves of alcohol faster.
- Pound for pound, men have more blood in their vascular systems, so alcohol is diluted more in men.
- A higher percentage of body fat in women tends to concentrate more alcohol in blood plasma than in men, which raises BAC in women.

In most states, a BAC of 0.08 percent is legal intoxication. However, the selection of 0.08 as the cutoff is arbitrary, which means that a person may not necessarily be able to drive safely with a lower BAC. According to the U.S. Department of Transportation, truck drivers are not allowed to drive at 0.04, and pilots should test no higher than 0.02 after going 24 hours without a drink. Behavioral impairment can begin at 0.01. Even at this low BAC level, the time it takes to react increases, as does the likelihood of accidents.

But if alcohol depresses the nervous system, why do so many people report feeling "enlivened" or stimulated after drinking small amounts? Indeed, how do we explain the following?

- René is normally quiet but talks a mile a minute after drinking a bottle of hard lemonade.
- Nick is usually mild mannered but becomes aggressive after downing a couple of beers.
- Juanita is a penny pincher but leaves the server a huge tip after an evening of gin and tonics at a bar.



KEN KARP/DIGITAL LIGHT SOURCE/NEWSCOM

Preventing Problems

Random Breathalyzer tests help remind drivers not to drink and drive.

Driving Disasters

Too often, driving after drinking alcohol results in serious and even fatal car accidents.

© VICTOR BIRO/DEMOTIX/DEMOTIX/CORBIS

The answer lies in the brain area most affected by alcohol. Alcohol tends to shut down the parts of your brain responsible for controlling inhibitions and making judgments. So, poor decisions and unrestrained behaviors are typical in those under the influence of alcohol. This helps explain another example of alcohol-induced bad judgment: Most drinkers, even after scoring at or above 0.08 on a Breathalyzer test, judge themselves capable of driving home from the bar (Denton & Krebs, 1990; MacDonald et al., 1995). It also may help explain the fights, unwanted sexual advances, and risky sexual behavior that often go hand in hand with drinking (Cooper, 2006). Alcohol intoxication dramatically increases the probability that we will act out the inappropriate or dangerous urges we keep in check while sober.

Alcohol also impairs memory. I remember a former college classmate who, when questioned on Saturday morning after a night of drinking, couldn't remember what he'd done, where he'd been, and whom he'd been with the night before. He vigorously denied statements I had heard him make just 12 hours earlier. My classmate lost these Friday night memories partly because alcohol suppresses the processing of recent events into long-term memory. Alcohol also plays another peculiar trick with our memory: Experiences from the intoxicated state may not transfer to the sober state (Eich, 1980). Finally, alcohol suppresses dream sleep, which further disrupts memory storage.

The recreational use of alcohol often gets out of hand, leading to dependence, health problems, accidental injuries, or death. No other drug has generated more problems, concern, or controversy than alcohol has in this country. For evidence, look no further than our Constitution, where 2 of the 27 amendments deal solely and directly with alcohol. The combined yearly deaths from all illegal drugs are still fewer than the number of alcohol-related deaths each year (Siegel, 1990), and alcohol accounts for far too many. (See Thinking About Positive Psychology: Positive Emotions and Alcoholics Anonymous for a refuge that works for many suffering from alcoholism).

Thinking About POSITIVE PSYCHOLOGY

Positive Emotions and Alcoholics Anonymous

Alcoholism kills over 100,000 U.S. citizens every year. Professional medicine can detoxify and delay relapse, but most people dependent on alcohol treated only by modern medical science eventually relapse (Vaillant, 2008).

It is difficult to calculate the success rate of interventions such as Alcoholics Anonymous (AA), but a 50-year project by George Vaillant provides evidence that AA works where medical science fails. According to Vaillant, AA contrasts with modern medical science in that its attempted "cure" is relapse prevention. AA uses four factors to prevent relapse:

1. External supervision
2. Ritualized dependency on a competing behavior
3. New love relationships
4. Deepened spirituality

Vaillant points out that except for external supervision, these factors depend on *positive emotions.* Let's take a closer look at the last three.

Ritualized dependency on a competing behavior. You can't easily give up a habit without having something you enjoy to replace it. Bad habits give way to substitutes, not simply prohibition. AA meetings focus only on enjoyable, positive emotions. "Loving suggestions" replace criticism.

New love relationships. People dealing with alcoholism need to bond with people they have not hurt. Giving and receiving compassion and love aids recovery and decreases relapse. AA "home groups" become deeply trusted, nonjudgmental family units.

Spirituality. AA is not about religion at all. But spirituality (one of the 24 character strengths identified by Peterson and Seligman [2004]) is a common feature in recovery from drug dependency. Vaillant writes, "Inspirational, altruistic group membership and a faith in a power greater than 'me' is important to recovery from addiction."

Other studies (Humphreys & Moos, 1996) have shown that those recovering from alcoholism who attend AA regularly are much more likely to avoid relapse than those who only receive professional treatment. Vaillant believes this is because AA depends on positive emotions and being around other people and not simply compliance with treatment. To quote Vaillant, "Other people matter."

PAUSE NOW OR MOVE ON

Turn to page 172 to review and apply what you've learned.

Stimulants

WHAT'S THE POINT?

9-3 What are the physiological and psychological effects of stimulants?

We have noted that alcohol is a depressant, since it reduces neural activity and slows body functions. Next, we review **stimulants,** drugs that excite neural activity and speed up body functions. This category includes caffeine, nicotine, cocaine, and amphetamines. And one of those—caffeine—is the most used psychoactive drug in the world.

stimulants Drugs (such as caffeine, nicotine, and the more powerful amphetamines and cocaine) that excite neural activity and speed up body functions.

caffeine Stimulant found in coffee, chocolate, tea, and some soft drinks.

nicotine Stimulant found in tobacco.

Caffeine

Caffeine is the stimulant found in coffee, tea, cocoa, and cola. As many as 80 percent of the adults in this country consume some form of it daily (Julien, 2007). Many choose coffee as their caffeine delivery system. Coffee causes bad breath, stains your teeth, looks like motor oil, keeps you from sleeping, and tastes awful the first several times you drink it. Even after becoming hooked, many coffee drinkers require cream and sugar to force it down. So, why do millions reach for a cup to start their morning? Probably because an 8-ounce cup of brewed coffee can contain 175 milligrams of caffeine, while lattes and cappuccinos usually contain about half of that—still a hearty jolt (Starbucks, 2010). Caffeine rewards the user with a sense of increased energy, mental alertness, and forced wakefulness, which prompts continued use regardless of taste. With sluggishness sent packing, a caffeine dependency settles in.

Excess Espresso

Many adults have a caffeine dependency.

WWW.CARTOONSTOCK.COM

"No, I don't take any drugs, but I do have a $50 a day latte habit."

Unfortunately, as with so many psychoactive drugs, regular caffeine use produces tolerance as well as dependence. One cup no longer provides the artificial lift, so the caffeine drinker pours another cup (or buys another caffeinated soda). And then another. If you take in 200 or more milligrams of caffeine per day, you will probably experience withdrawal symptoms on a day you go without. Caffeine withdrawal includes headache, agitation, and tiredness, and the intensity of the withdrawal is tied directly to the normal daily amount of caffeine ingested. When the coffee pot runs dry, even mild-mannered tempers end on a short fuse.

I greatly underestimated the power of caffeine dependence early in my teaching career. It was my turn to start the 100-cup coffeemaker in the teachers' lounge by 7:00 A.M., and I simply forgot to do it. You've never seen so many adults become cranky so quickly, as withdrawal set in with no caffeine fix in sight. At lunch that day, a caffeine-deprived teacher jokingly suggested I be arrested for failure to percolate.

Drug Dependence?

Caffeine dependence may occur with as little as two small cups of coffee (200 milligrams) per day. A single 8-ounce cup of coffee from Starbucks can contain 175 milligrams of caffeine.

BENELUX/ZEFA/CORBIS

Although researchers have not found long-term damaging effects from small daily doses of caffeine (the equivalent of two small cups of coffee), you would be wise to avoid becoming dependent upon caffeine. Getting the sleep you need is infinitely better for your body (and attitude) than artificially stimulating a sleep-deprived brain.

Nicotine

Nicotine, the stimulant found in tobacco, ranks up there with alcohol and caffeine in the most used drug category. The stimulating effects of nicotine are similar to those of caffeine, but nicotine usually enters the body in a cloud of thick, deadly smoke from a cigarette. Nicotine is extremely addictive

A. GLAUBERMAN/SCIENCE SOURCE/PHOTO RESEARCHERS, INC.

Smoker's Lung

The lung on the left was a healthy, normal lung. The lung on the right belonged to a smoker. We can't always see the damage smoking causes.

and does not stay long in the body. For a nicotine-dependent smoker, this means lighting up frequently to sustain the effect. The statistics on smoking are bone-chilling (Julien, 2007):

- In the United States, 6000 teenagers will light up for the first time today.
- Of these, 3000 will develop a smoking habit and 1000 will die from smoking-related diseases.
- A full 37,000 nonsmokers will die this year from heart disease contracted by inhaling secondhand smoke.
- Another 4000 nonsmokers will contract lung disease from secondhand smoke this year.
- Worldwide, the World Health Organization reports that close to 1 billion will likely die of tobacco use this century (2008b).

Nearly 450,000 smokers will die in the United States this year alone because of their tobacco use. The good news about smoking, if that's possible, is that we've seen a 90 percent decline in the number of adults who smoke or chew tobacco (also a deadly habit) over the past 35 years (Rose et al., 1999), and 81 percent of smokers want to quit (Jones, 2007). Nicotine replacement therapies, where nicotine comes into the body through chewing gum, nasal sprays, or patches worn on the skin, have helped thousands kick the tobacco habit.

Cocaine

For centuries, some South American people have chewed the leaves of the coca plant for medicinal and religious purposes, as well as to increase endurance. It wasn't until the 1850s that scientists identified, purified, and named the active ingredient—**cocaine,** a stimulant derived from the leaves of the coca plant (Julien, 2007). In the 1880s, Americans used cocaine as a surgical anesthetic, among other medical uses.

Austrian physician Sigmund Freud prescribed cocaine in the early 1900s as a treatment for depression and chronic fatigue. He quickly reversed his stance after discovering cocaine's horrible side effects, which include dependence, tolerance, and depression after you quit taking it.

cocaine Stimulant derived from the leaves of the coca plant.

© PETER ARNOLD, INC./ALAMY

Coca Leaves

Cocaine is extracted from leaves like these.

Like Freud, Coca-Cola initially endorsed cocaine. During the late 1800s, the company started adding about 60 milligrams of the active ingredient from the coca plant to every serving. A long-running Coke advertising campaign used to identify the sweet soda as "the real thing." Well, from 1896 to 1904, Coke was indeed the real thing. The company later changed the formula, replacing cocaine with caffeine.

In 1910, President William Howard Taft labeled cocaine "public enemy number one"; soon after, the drug was banned. The advent of less expensive, but still illegal, amphetamines in the 1930s replaced recreational cocaine use for many Americans. Cocaine made a regrettable comeback in the late 1970s, with the introduction of inexpensive cocaine crystals called *crack*.

Cocaine and crack cocaine produce a strong euphoric effect but an even stronger crash. The user is instantly dependent, craving more cocaine to temporarily overcome the crash. All this places considerable strain on the cardiovascular system, which in some cases leads to instant death. Crack and cocaine users also can experience frightening feelings of paranoia and suspicion.

Amphetamines

I grew up hearing about **amphetamines** called *speed* or *uppers,* words that still characterize amphetamines' stimulating effects. What I didn't grow up hearing about was the cheaper and more dangerous amphetamine derivative, *methamphetamine* (also called *meth, crystal meth,* and *crank*).

Amphetamines' effects include restlessness, high blood pressure, insomnia, agitation, loss of appetite, and a state of hyperalertness. As with most stimulants, tolerance builds quickly, and to get high, longtime amphetamine abusers have been known to take doses 10 times the amount that would be lethal for a first-time user (Julien, 2007).

Methamphetamine is more potent than regular amphetamines. And "ice" is to methamphetamine as "crack" is to cocaine. A major difference is that ice stays in your system much longer than crack cocaine. Drug researcher Robert Julien (2007) warns of methamphetamine's dangers by using the following analogy: When referring to fast runners who help improve a team's chances of victory, football, soccer, and track coaches often use the colorful figure of speech "speed kills." But for high doses of methamphetamine, "speed kills" is not merely a figure of speech.

amphetamines Drugs that stimulate neural activity, speeding up body functions.

ecstasy Also called MDMA, this hallucinogenic stimulant produces lowered inhibitions, pleasant feelings, and greater acceptance of others.

Ecstasy

The hallucinogenic stimulant **ecstasy** (the street name for MDMA, or methylenedioxymethamphetamine) produces lowered inhibitions, pleasant feelings, and greater acceptance of others. Ecstasy was first manufactured more

than 80 years ago, but this amphetamine derivative experienced a rebirth of sorts in the late 1990s. It is closely associated with rave-type dances, where hundreds of partygoers pack in shoulder to shoulder and dance to techno music for most of the night. The stimulating effects of the drug enable dancers to maintain the frenzied pace longer than they normally could.

The drug is seductive because it is relatively inexpensive, but its physiological and mental costs can be extremely high. Even moderate users may experience *permanent* brain damage, losing memory, concentration, and verbal reasoning skills (Laws & Kokkalis, 2007; McCann, 1999; Morgan, 1999).

AP PHOTO/DALE SPARKS

Dance 'Til You Drop?

The long-term consequences of taking ecstasy include permanent brain damage and memory loss.

PAUSE NOW OR MOVE ON

Turn to page 172 to review and apply what you've learned.

Hallucinogens

WHAT'S THE POINT?

9-4 What are the physiological and psychological effects of hallucinogens?

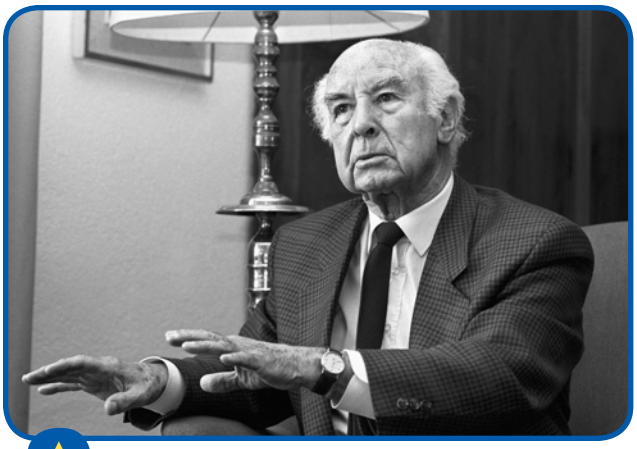
Hallucinogens—sometimes called *psychedelics*—are drugs that distort perceptions and evoke sensory images in the absence of corresponding sensory input. The most commonly used hallucinogens were first made in a laboratory. Most labs producing these drugs today are illegal. Let's take a closer look at one hallucinogen, LSD.

LSD

LSD (lysergic acid diethylamide) is a powerful hallucinogenic drug that is sometimes called *acid*. The first LSD experience by a human was an accident. Albert Hoffman, a Swiss chemist who first synthesized LSD in 1938, accidentally ingested the drug in April 1943 and found himself "seized by a peculiar sensation of vertigo and restlessness. Objects, as well as the shape of my associates in the laboratory, appeared to undergo optical changes" (Hoffman, 1994). Hoffman's experience is similar to that of those who have taken an "acid trip," where visual distortions, detachment from reality, and panic are common. Acid trips vary from person

hallucinogens Psychedelic (mind-manifesting) drugs, such as LSD, that distort perceptions and evoke sensory images in the absence of sensory input.

LSD (lysergic acid diethylamide) Powerful hallucinogenic drug; also known as acid.



RETO GISIN, KEYSTONE/AP IMAGES

Weird Science

Albert Hoffman, a chemist, discovered and was the first to ingest LSD.

to person. Some people experience a mildly pleasant or unpleasant reaction; others have nightmarish or deadly experiences. Panic-stricken LSD users, unable to detect the difference between reality and fabrication, can be dangerous not only to themselves but also to others.

Consciousness-altering LSD is made in the laboratory, but other hallucinogens are found in nature. *Mescaline* (from the peyote cactus) and *psilocybin* (from certain mushrooms) both produce perceptual disruption of time and space. Some states allow the use of these drugs for centuries-old religious ceremonies, but all states outlaw them for recreational use.

PAUSE NOW OR MOVE ON

Turn to page 173 to review and apply what you've learned.

Marijuana

WHAT'S THE POINT?

9-5 What are the physiological and psychological effects of marijuana?

It was used to make rope as far back as 8000 B.C. It was used for medical purposes in China in 5000 B.C. and for religious purposes in India in 2000 B.C. It comes from the *cannabis sativa,* or hemp, plant and is called *ganja, sinsemilla, pot, hash, Mary Jane, dope, weed, bhang,* and many more names. Most often, it's called **marijuana**—the leaves, stems, and flowers from the hemp plant. When smoked, marijuana lowers inhibitions and produces feelings of relaxation and mild euphoria.

Marijuana doesn't fit neatly into any of the categories we've discussed thus far for several reasons:

- Its behavioral effects are similar to those of low doses of alcohol, but different in that high doses do not suppress breathing and are not lethal.
- Compared with LSD, it produces only mild hallucinogenic experiences.
- Its chemical structure does not resemble that of hallucinogens.

For these reasons, we've given marijuana its own category in this module.

Marijuana's active ingredient, *delta-9-tetrahydrocannabinol (THC),* was isolated in 1964. When smoked, THC heightens sensitivity to tastes, smells, and sounds. THC can stay in a regular user's body for months, producing a kind of reverse-tolerance effect. That is, the user can take smaller subsequent doses to induce the "high" feeling once again because of the amounts of THC

marijuana Leaves, stems, resin, and flowers from the hemp plant that, when smoked, lower inhibitions and produce feelings of relaxation and mild euphoria.

already stored in the body. Withdrawal is unpleasant and occurs within 48 hours of nonuse. Symptoms include depression, insomnia, nausea, cramping, and irritability.

As with most psychoactive drugs, marijuana's temporary pleasures come at a long-term cost:

- Frequent marijuana users are at higher risk to experience depression and possibly schizophrenia (Hall, 2006; Murray et al., 2007).
- Pot smoke is far harder on your lungs than cigarette smoke (Wu et al., 1988).
- Brain cell loss accelerates with large doses (Landfield et al., 1988).
- Memory is still impaired long after marijuana's effect has worn off (Messinis et al., 2006).
- Marijuana seems to suppress the immune system, making it harder for your body to fight off disease and infection (Childers & Breivogel, 1998).

Several states have passed laws allowing marijuana to be administered under a physician's supervision for certain medical conditions. There is some evidence suggesting THC counteracts both nausea accompanying cancer's chemotherapy treatments and several terrible side effects of AIDS (Benson & Watson, 1999).

PAUSE NOW OR MOVE ON

Turn to page 173 to review and apply what you've learned.

Prevention

WHAT'S THE POINT?

9-6 What factors help prevent the use of dangerous psychoactive drugs?

Consider these questions:

1. Is education related to psychoactive drug use?
2. Is hopelessness related to dependence?
3. Is genetics a factor in the development of dependence?
4. Are your peers' attitudes toward drugs important?

The answer to all of these questions is *Yes*.

1. *Education is related to drug use.* Roughly 15 percent of U.S. college dropouts smoke, as do a whopping 42 percent of high school dropouts (Ladd, 1998).
2. *Hope matters.* Those who believe their lives are meaningless are more likely to take drugs (Newcomb & Harlow, 1986).

An Ounce of Prevention

One of the best ways to avoid drinking and smoking is to hang out with friends who don't smoke or drink.

© CORBIS FLIRT/ALAMY

3. *Genetics plays a role.* Geneticists have, for example, found a gene occurring more often among alcohol-dependent people than among others (Noble, 1993).
4. *Peers count.* If the friends you hang out with *never* light up or drink alcohol, there is a good chance you won't either.

If a person is already dependent on some psychoactive substance, effective treatment is essential. However, prevention, or inoculation against ever starting on drugs, is even more important. There are three vital sides to prevention's triangle:

1. A clear understanding of the painful, long-term costs of psychoactive drug use, despite pleasurable, short-term rewards (see **Table 9.2**)

Table 9.2

A Guide to Selected Psychoactive Drugs

Drug	Type	Pleasurable Effects	Adverse Effects
Alcohol	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, and impaired reactions
Heroin	Depressant	Rush of euphoria and relief from pain	Depressed physiology and agonizing withdrawal
Caffeine	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
Methamphetamine	Stimulant	Euphoria, alertness, and energy	Irritability, insomnia, hypertension, and seizures
Cocaine	Stimulant	Rush of euphoria, confidence, and energy	Cardiovascular stress, suspiciousness, and depressive crash
Nicotine	Stimulant	Arousal and relaxation; sense of well-being	Heart disease and cancer
Ecstasy (MDMA)	Stimulant and mild hallucinogen	Euphoria and disinhibition	Brain damage, depression, and fatigue
Marijuana	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, and relaxation	Disrupted memory and lung damage from smoke

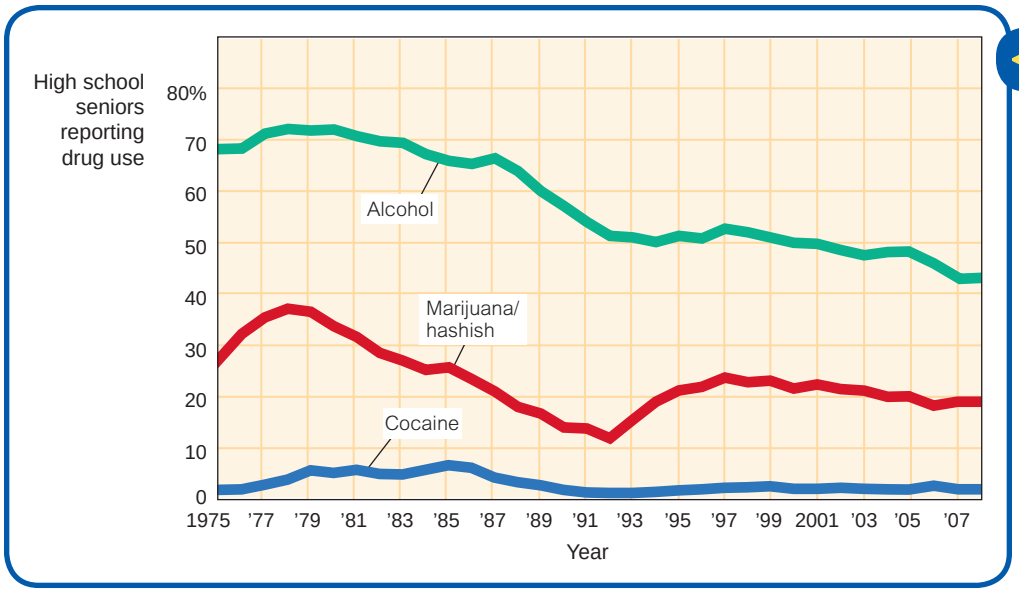


Figure 9.3
Self-Reports of Drug Use Among High School Seniors

Reported use of alcohol, marijuana, and cocaine declined among high school seniors from 1979 to 1992. Marijuana use partially rebounded after 1992, with drug paraphernalia becoming easier to purchase in local stores. Since then, however, it has joined alcohol and cocaine use in declining or holding steady. (From Johnston et al., 2009.)

2. Positive environments that increase self-esteem and foster determination in teens
3. Associating with peers who are adept at saying *No* or willing to learn how to refuse

Drug use among high school seniors dropped steadily from 1979 to 1992 but, as **Figure 9.3** indicates, marijuana use unfortunately rose for several years after that (Johnston et al., 2009). However, peer groups who disapprove, an understanding of the physiological and psychological costs of drug use, and positive self-regard could help renew a downward trend. Will you be a part of the solution?

PAUSE NOW OR MOVE ON

Turn to page 173 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 9
Thinking About Psychoactive Drugs

What Are Psychoactive Drugs?

WHAT'S THE POINT?

9-1 What are psychoactive drugs, and what is dependence?

- Psychoactive drugs are chemical substances that alter mood, behavior, or perceptions.
- Drug dependence is a state of physiological or psychological need to take more of a drug after continued use.

Apply What You Know

1. Anyone who experiences cravings for a drug and withdrawal symptoms without the drug can be said to be _____ that drug.
   a. resistant to
   b. dependent on
   c. tolerant of
   d. psychoactive of
2. What is the relationship between tolerance and withdrawal?
   a. Withdrawal refers to negative effects of drug use, and tolerance refers to positive effects.
   b. Drug users may need to take increasing dosages of a drug (tolerance) to avoid negative side effects of stopping drug use (withdrawal).
   c. Repeated use of a drug will always produce withdrawal effects and can lead to tolerance.
   d. Physical side effects of repeated drug use (tolerance) can be avoided if users go through long periods without using the drug (withdrawal).

Alcohol: A Depressant

WHAT'S THE POINT?

9-2 What are the physiological and psychological effects of drinking alcohol?

- Alcohol is a depressant, so its main effects are to reduce neural activity and slow body functions. Alcohol slows the parts of the brain responsible for controlling inhibitions and making judgments.
- Alcohol is the most commonly used depressant and is the second most used psychoactive drug. Most people use alcohol responsibly, but recreational use of alcohol can get out of hand, leading to dependence, health problems, accidental injuries, or death.

Apply What You Know

3. Which cognitive activity is most dramatically affected by alcohol use?
   a. nonverbal communication
   b. visual perception
   c. problem solving
   d. encoding memories
4. Although alcohol is a _____, some people report feeling stimulated after drinking because alcohol _____.
   a. depressant; lowers inhibitions
   b. hallucinogen; raises blood pressure
   c. amphetamine; excites neural activity
   d. psychoactive drug; acts as a stimulant on the nervous system

Stimulants

WHAT'S THE POINT?

9-3 What are the physiological and psychological effects of stimulants?

- Stimulants excite neural activity and speed up body functions.
- Caffeine is used by more than 80 percent of adults, and regular use produces both tolerance and dependence.
- Nicotine produces effects similar to those of caffeine but is more addictive.
- Cocaine is a powerful stimulant derived from the leaves of the coca plant. Dependency occurs instantly after the first use, and its users crave more cocaine to temporarily overcome withdrawal symptoms.
- Amphetamines cause restlessness, high blood pressure, insomnia, agitation, loss of appetite, and a state of hyperalertness. Tolerance builds quickly, and longtime amphetamine abusers may take doses 10 times the amount that would be lethal for a first-time user.
- Ecstasy is a hallucinogenic stimulant that produces lowered inhibitions, pleasant feelings, and greater acceptance of others. Repeated use may result in brain damage, possibly affecting memory, concentration, and reasoning skills.

Apply What You Know

5. Two of the most commonly used stimulants in cultures around the world are
   a. beer and wine.
   b. marijuana and hashish.
   c. cocaine and tobacco.
   d. nicotine and caffeine.

6. A person who usually buys one coffee drink on the way to work in the morning but then starts feeling tired and sluggish unless she drinks another one after lunch is experiencing
   a. tolerance to caffeine.
   b. depression from lack of stimulant.
   c. cravings for amphetamines.
   d. lowered inhibitions.

Hallucinogens

WHAT'S THE POINT?

9-4 What are the physiological and psychological effects of hallucinogens?

- Hallucinogens cause changes in how we perceive the world. Different hallucinogens produce different kinds of distortions of reality. Some people may experience mild or moderate hallucinations that they report as pleasant, but some hallucinations can be disturbing and even harmful.
- Repeated use of any hallucinogen can affect cognitive abilities, including memory, concentration, and communication skills.

Apply What You Know

7. The main difference between hallucinogens and the other drug categories is
   a. withdrawal effects are not produced by long-term use of hallucinogens, but they are associated with stimulant and depressant use.
   b. stimulants and depressants do not produce tolerance, but hallucinogens do.
   c. hallucinogen users experience withdrawal effects immediately after using the drug for the first time.
   d. hallucinogens interfere with perceptions of sensations instead of speeding up or slowing down the nervous system.
8. The primary hallucinogen discussed in the text was developed
   a. to help treat stimulant addictions.
   b. in a chemistry laboratory.
   c. to protect stimulant users from withdrawal effects.
   d. for deliberate use.

Marijuana

WHAT'S THE POINT?

9-5 What are the physiological and psychological effects of marijuana?

- Marijuana lowers inhibitions and produces feelings of relaxation and mild euphoria.
- Marijuana doesn't fit well into the other categories of psychoactive drugs.
- Marijuana's active ingredient, delta-9-tetrahydrocannabinol (THC), heightens sensitivity to tastes, smells, and sounds. Repeated use can result in a reverse-tolerance effect because THC remains in the body for months. Regular use can damage the lungs, accelerate brain cell loss, impair memory, and suppress the immune system.
- Withdrawal symptoms can include depression, insomnia, nausea, cramping, and irritability.

Apply What You Know

9. Which of the following most accurately describes some long-term effects of marijuana use?
   a. lung damage, brain cell loss, and memory impairment
   b. increased tolerance to the drug because the active ingredient does not stay in the body long
   c. heart damage and repeated perceptual distortions
   d. restlessness, high blood pressure, loss of appetite, and hyperalertness
10. True or False: THC, found only in the flowers of the hemp plant, lowers inhibitions and produces feelings of relaxation and mild euphoria when smoked.

Prevention

WHAT'S THE POINT?

9-6 What factors help prevent the use of dangerous psychoactive drugs?

- Risk factors for damaging drug use include dropping out of school, feelings of hopelessness, genetic history of drug use, and peers who use drugs.
- An understanding of the harmful, long-term effects of drugs, a positive environment, and non-drug-using peers help prevent young people from starting drug use.

Apply What You Know

11. True or False: Research indicates that feelings of hopelessness are unrelated to predicting if a person will become a drug user.
12. True or False: If the friends you hang out with *never* smoke cigarettes, the chances you'll smoke are very slim.

KEY TERMS

psychoactive drug, p. 157
dependence, p. 157
withdrawal, p. 158
tolerance, p. 158
depressants, p. 159
stimulants, p. 163
caffeine, p. 164
nicotine, p. 164
cocaine, p. 165
amphetamines, p. 166
ecstasy, p. 166
hallucinogens, p. 167
lysergic acid diethylamide (LSD), p. 167
marijuana, p. 168

MODULE 10

Hypnosis and Other States of Consciousness

States of Consciousness

Hypnosis

- What Is Hypnosis?
- Hypnosis Techniques
- Applications of Hypnosis

Relaxation and Meditation

Relax . . . you are getting verrrry sleeeepy. Is a swinging watch necessary for hypnosis? If not, what does produce this remarkable state of consciousness? Let's get comfortable and learn about hypnosis, relaxation, and meditation.

States of Consciousness

WHAT'S THE POINT?

10-1 How does dual processing help explain differing states of consciousness?

What are you doing right now? Yes, I know you're reading, but what else is going on? I bet you're breathing. You're also pumping blood, maintaining a sense of balance, controlling the temperature of your body, listening to sounds in your environment, blinking occasionally to keep the surface of your eyes clean and moist, digesting the remnants of your last meal, and literally hundreds of other things. Pretty amazing, isn't it?

The nature of **consciousness** is to process information on two tracks. A tiny amount of information is on the conscious (or explicit) track. This

consciousness Awareness of yourself and your environment.

Figure 10.1
Change Blindness

Imagine yourself in the position of the white-haired gentleman. The man with the map in the left image has just asked you, a stranger, for directions. As you are talking, two rude workers (actually confederates of the researcher) carrying a door walk right between you and the man who needs directions. As the door passes between you, the man with the map quickly changes places with the second door carrier. Would you notice the change? Two out of three people in this experiment did not!

is the limited amount of information that you are aware of at any given point of time; it is the information appearing on your "mental screen." A far larger amount of information is dealt with on an unconscious (also called implicit) track—that is, without awareness. Your brain is continually monitoring and adjusting behind the scenes to free up your awareness for the things you want to focus on. It's much like when an executive hires an administrative assistant to take care of the numerous routine tasks that must be accomplished in the course of the day. This enables the executive to turn her attention to a limited number of high-priority tasks, confident that the mundane but necessary work is being taken care of. This ability to process information both consciously and unconsciously at the same time is called **dual processing.**

One fascinating result of this dual processing is *change blindness,* our failure to notice changes in our environment because the conscious awareness track of our mind is so narrow. Would you notice if a stranger you were giving directions to suddenly changed into a different stranger (Simons & Ambinder, 2005)? Remarkably, two-thirds did not when put into this situation (see **Figure 10.1**). The narrow, conscious track of the mind is occupied with providing the directions, so the change in the environment, if it is noticed at all, is registered only by the unconscious mind.

In this module, we'll explore some of the more interesting variations of consciousness. Hypnosis may or may not involve a form of dual processing—research has yet to provide a definite answer. Then we'll look at relaxation and meditation, both methods of using our conscious awareness of self to improve our lives.

Hypnosis

Ever been hypnotized? For several years, my school's postprom party has featured an entertainer who uses hypnosis as part of his act. Students always return to class on the following Monday tired but full of questions about what they've seen and, in some cases, what they've experienced. Let's look at how psychology can help us understand what happens during hypnosis.

dual processing The principle that information is often processed on separate conscious and unconscious tracks at the same time.

PAUSE NOW OR MOVE ON

Turn to page 186 to review and apply what you've learned.

AP/WIDE WORLD PHOTOS

Equally Reliable?

Stage hypnotists such as the one who suggested these students were on the beach in need of sunscreen fascinate their audiences with many of the same techniques researchers examine in the laboratory.

What Is Hypnosis?

WHAT'S THE POINT?

10-2 Is hypnosis really a different state of consciousness?

Hypnosis is a social interaction in which a hypnotist makes suggestions about perceptions, feelings, thoughts, or behaviors and the person experiencing hypnosis follows those suggestions. For example, a hypnotist might suggest that a young man is at a funny movie, and he would begin to laugh heartily. Or a hypnotist might suggest that a woman's arm was filling with helium and her arm would rise in the air. Researchers, therapists, and entertainers—and most of the rest of us—are interested in why these suggestions seem to have such power over people. Psychologists have proposed two key explanations: social influence theory and divided consciousness theory.

Social Influence Theory

As evidence, supporters of social influence theory note that no special physical condition marks hypnosis as anything other than normal consciousness—the natural state of awareness we experience when we're fully awake and alert (Lynn et al., 1990; Spanos & Coe, 1992). Our social environment can indeed have a huge effect on our behavior and experiences. One day this year I was feeling fine until my wife said my voice sounded scratchy and asked if my throat hurt. All of a sudden, I started to feel as though I was becoming ill. I never did get sick, so it was apparently only my wife's suggestive question that made me feel less than 100 percent.

Peer pressure, one of the many forms of social influence, can lead people to behave in ways they wouldn't normally. A "mob mentality," for example, may lead otherwise law-abiding sports fans to engage in destructive behavior while "celebrating" a big win. Social influence is also apparent in religious cults. A charismatic leader may seem to cast a spell on followers, who then behave in ways they would have had difficulty imagining before the cult experience.

Is hypnosis governed by similar social pressures? Certainly the hypnotist's status and authority increase the likelihood that people will be influenced

hypnosis Social interaction in which a hypnotist makes suggestions about perceptions, feelings, thoughts, or behaviors and those suggestions are followed.

social influence theory Theory that powerful social influences can produce a state of hypnosis.

divided consciousness theory Theory that during hypnosis our consciousness splits so that one aspect of consciousness is not aware of the role other parts are playing.

by suggestions. And hypnotized people often want to appear cooperative, which increases their suggestibility. Keep in mind that neither the hypnotist nor the person hypnotized is necessarily faking it—both may believe strongly in the powers of hypnosis. In fact, the stronger their beliefs, the more likely they are to experience results—real results. The strongest support for the **social influence theory** is that behaviors produced with hypnosis can often be produced in other ways. You may hypnotize me into believing I have a suggested illness, but I might also acquire this belief by reading a list of symptoms or by seeing a program on television. I might even succumb to an offhand comment like the one made by my wife.

Divided Consciousness Theory

Opposing social influence theory are psychologists who believe hypnosis is a state of **divided consciousness,** that our consciousness splits so that one aspect of consciousness is not aware of the role other parts are playing. We are all capable of dividing our consciousness to some extent. When I go out for a long run, for example, I sometimes get so caught up in thinking about things that a mile goes by unnoticed. Some tiny part of my consciousness continues to monitor traffic, curbs I might trip over, and the route, so that the rest of my mind can spin free on other topics.

STANFORD UNIVERSITY PRESS

ERNEST HILGARD (1904–2001) Pioneering hypnosis researcher and an advocate of the divided consciousness theory of hypnosis.

Ernest Hilgard argued that hypnosis is a more dramatic form of this divided consciousness (1986, 1992). He stumbled on this idea while demonstrating hypnosis to his class at Stanford University one day. He used a suggestion to produce deafness in a hypnotized student and then challenged the class to prove that the young man was not deaf. Class members tried the sorts of things you probably would, such as sneaking up behind the young man and making loud noises and insulting him in hopes of getting a response. Nothing worked until one student asked if there was a part of the hypnotized person that was still listening. Hilgard was skeptical, but he asked the student to raise his finger if some part of him could still hear. Up went the finger. The

PAINTINGS/SHUTTERSTOCK

Hypnosis as Divided Consciousness

Ernest Hilgard has demonstrated that some part of the consciousness of hypnotized people, like this young woman, remains aware of pain (causedhere by ice water) even though such participants behave as though pain does not exist. Hilgard called the part that remained aware the "hidden observer."

odd thing is that even the person did not know why he had raised his finger until it was explained to him after the demonstration. The part that could hear, which Hilgard called the *hidden observer,* was so effectively divided from the rest of his consciousness that even the person was unaware of it.

The key difference between the two explanations of hypnosis is this: Social influence theory says that hypnosis is a result of *external* social variables; divided consciousness theory says that hypnosis is the result of an exaggerated division of *internal* consciousness. It's possible, of course, that both positions may be partially correct. Hypnosis is complex enough that several variables may be interacting to produce the effects (Kihlstrom & McConkey, 1990).

By now you may be wondering just how someone enters into this complex state of being hypnotized. Let's consider some of the techniques used.

PAUSE NOW OR MOVE ON

Turn to page 186 to review and apply what you've learned.

Hypnosis Techniques

WHAT'S THE POINT?

10-3 How powerful are hypnotic suggestions?

Have you seen hypnosis depicted in cartoons? Perhaps the hypnotist was swinging a pocket watch on a chain back and forth or using a spiraling disc. The zombie-like hypnotized person muttered, "Yes, master," and lurched forward with outstretched arms to do the hypnotist's bidding. As you may have guessed, the reality of hypnotic induction is far different. Inducing hypnosis requires nothing more than the hypnotist's voice and is so easily accomplished that the Federal Communication Commission set up rules preventing the procedure from being broadcast on television. A hypnotist performing on TV could hypnotize people at home in their living rooms. Stage hypnotists do experience this problem. They frequently find that some members of the audience become as deeply hypnotized as the volunteers on stage.

There is nothing magical or mystical in the process—the "secret" is a calm, rhythmic tone in the hypnotist's voice, which becomes a focal point for the person's attention. The hypnotist begins by giving easy, logical suggestions. ("Your eyes are getting tired. You feel very relaxed.") Most people find the state of hypnosis to be relaxing, so these suggestions are particularly easy to follow. Continuing to focus the person's attention, the hypnotist then gradually moves on to more difficult tasks.

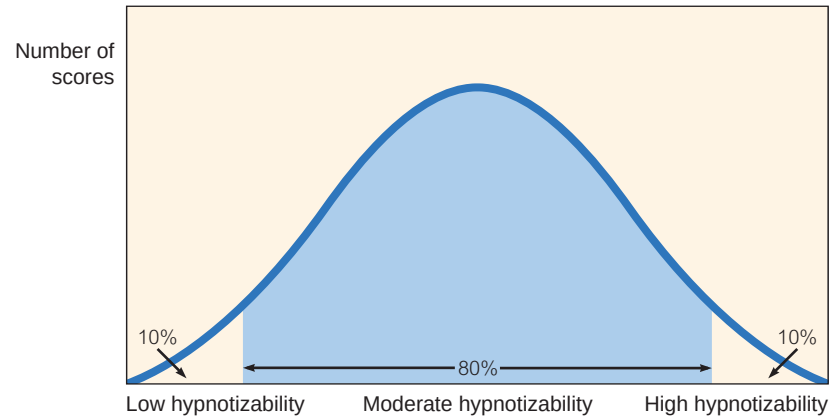
Hypnosis is sometimes falsely characterized as a "deep sleep." During hypnosis, people sometimes do physically slump in their chairs. However, it is possible to talk, move, and open your eyes while hypnotized.

Certain tests help determine in advance who may be a good candidate for hypnosis. The Stanford Hypnotic Susceptibility Scale, in which people respond to a series of suggestions (for example,

"Puffy, red, tired eyes? Heavy eyelids? Getting heavier? Heavier. Completely relaxed now. On the count of 10, you will awaken fresh, invigorated and ready to support our following sponsors . . ."

Figure 10.2
Stanford Hypnotic Susceptibility Scale

Can everyone be hypnotized? People differ in how susceptible they are to hypnosis. About one-tenth of all people are excellent candidates for hypnosis, and an equal number are difficult to hypnotize. Most people are moderately susceptible to hypnosis.



that your hands are glued together and you cannot separate them), is one such test. This test indicates that most people are moderately hypnotizable. About 10 percent are poor candidates, and an equal number are highly hypnotizable; the rest fall in the middle (see **Figure 10.2**). The higher you score on this scale, the more easily you can be hypnotized and the more easily you will respond to suggestions. In general, those who are imaginative and prone to fantasy are better suited for hypnosis (Barnier & McConkey, 2004).

Hypnotizability also depends on the circumstances of the hypnosis session. It is more difficult to achieve hypnosis in front of an audience than in a one-on-one private office session. Less susceptible individuals who do not become hypnotized on stage may respond differently in an office setting.

Hypnotic Suggestions The key technique in hypnosis is making suggestions that the hypnotized person follows. These suggestions can influence a variety of behaviors, sensations, thoughts, and emotions (Bowers, 1976). This means that hypnotized people can be made to flap their arms like birds, hallucinate the smell of roses, believe that it's midnight in the middle of the day, or be angry about something that supposedly happened at school. The hypnotist creates a new and interesting reality. Sometimes the results are entertaining, which explains the popularity of stage hypnotists like the one who performs at my school's postprom party.

How powerful are these suggestions? Could they lead you to do something against your will? Could an evildoer hypnotize you to commit crimes on her behalf? The answers to these questions are complicated. In one study (Orne & Evans, 1965), hypnotized people dipped their hands into what they were told was acid and then threw the "acid" into the face of another person. Proof that hypnosis could be used to do evil deeds, right? Not necessarily. There are other explanations for this behavior. Perhaps the hypnotized participants knew that—because they were involved in an experiment—they wouldn't be asked to do something truly harmful. Or perhaps our natural tendency to obey an authority figure could by itself produce these results. When nonhypnotized people were asked to engage in the same acid-throwing behavior, they were just as likely as the hypnotized people to do so. This seems to indicate that

hypnosis alone does not cause the behavior. Hypnosis *can* lead people to do things they otherwise wouldn't, but so can powerful suggestions of any kind.

Posthypnotic Suggestions

Some hypnotic instructions, called **posthypnotic suggestions,** are carried out by the individual *after* the hypnosis session has ended. Entertainers may, for example, make a posthypnotic suggestion that a person bark like a dog on a prearranged signal after returning to the audience. Therapists also use this technique to help clients lose weight or with some other objective. The hypnotist may plant a posthypnotic suggestion that certain high-calorie foods will taste terrible, like rancid meat. Research indicates that people with low hypnotic susceptibility benefit just as much from posthypnotic suggestions as do those with high hypnotic susceptibility (Bowers & LeBaron, 1986). This finding suggests that the therapist's attention may be as important as the posthypnotic suggestion itself. People in therapy programs that don't rely on hypnosis may show as much improvement as those who opt for hypnosis.

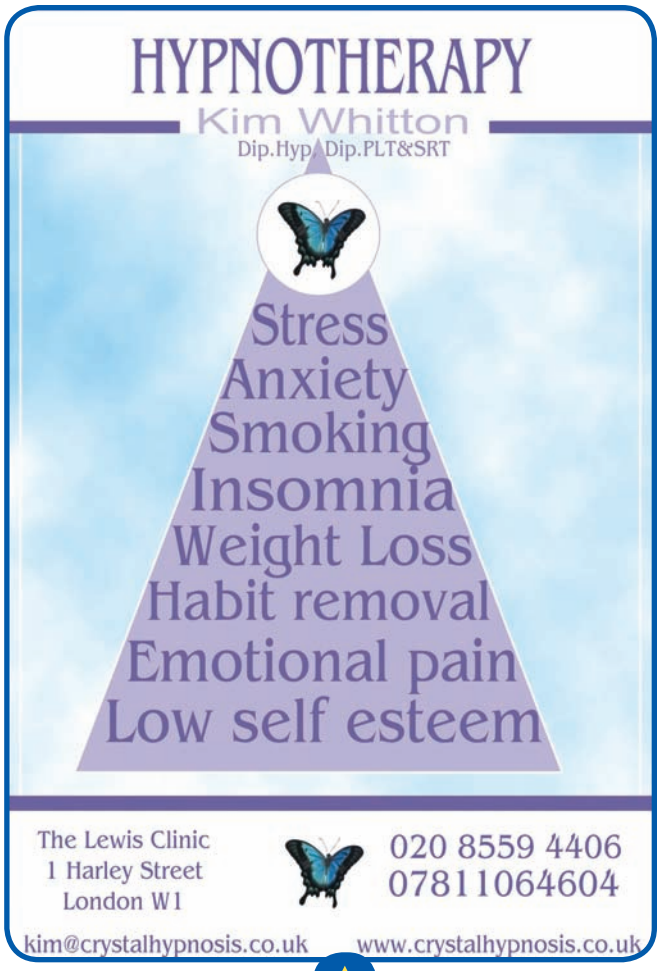
Hypnotists also use posthypnotic suggestions to save time, money, and stress for clients they meet with regularly. The hypnotist may suggest that at the next session the person will be hypnotized as soon as the hypnotist provides a particular signal, such as a touch to the left shoulder.

It's also interesting that hypnotized people usually report remembering what occurred while they were hypnotized unless the hypnotist produces *posthypnotic amnesia* by suggesting they will not.

Are these techniques reliable and useful? In the next section, we'll turn to what the research suggests.

PAUSE NOW OR MOVE ON

Turn to page 186 to review and apply what you've learned.



COURTESY OF KIM WHITTON

A Magical Cure?

Many people turn to hypnosis for help to stop smoking or lose weight. How effective are these programs? It turns out that people enrolled in programs that don't use hypnosis fare just as well.

Applications of Hypnosis

WHAT'S THE POINT?

10-4 Can hypnosis improve our memory or our physical state?

Memory and pain control are the two bookends of hypnosis. On the one side, researchers are skeptical of claims that hypnosis can enhance memory. On the other, they accept claims that hypnosis can help control pain. As you

posthypnotic suggestion
Hypnotic suggestion that the person will carry out after the hypnosis session has ended.

might imagine, other claims tend to fall somewhere in the middle of this bookshelf.

Hypnosis and Memory Many people believe that hypnosis is a good way to retrieve lost memories. The idea is that if memories can somehow become "lost," hypnosis may provide a way to retrieve them from the subconscious (a proposed storehouse for ideas and memories you cannot easily access) or wherever else they may be hiding. This idea has appeared in the media so often that most college students agree that a person can accurately recall events from childhood while under hypnosis (Furnham, 1993). Some police departments have even used hypnosis to try to uncover details witnesses may have lost.

There *have* been instances when individuals recovered seemingly lost memories during hypnosis sessions. For example, Ed Ray, a bus driver who had been kidnapped and held captive with 26 children in 1976, was able, when hypnotized, to remember enough of the kidnappers' license plate to lead to an arrest.

However, we need to be cautious about generalizing from these specific cases. First, they are quite rare. Second, we cannot be sure that hypnosis was the reason for the retrieval—maybe the memory would have come back anyway. The most substantial problem is that hypnosis is a state of suggestibility. In an effort to please the hypnotist, the hypnotized person may inadvertently manufacture *untrue* details and then later be unable to distinguish the real from the unreal. This happens even without hypnosis because your brain stores memories in pieces, much like a jigsaw puzzle. (See Modules 22 and 23 to learn more about memory.) When you try to retrieve a memory, your brain may not be able to locate all the pieces, and then it fills in the "holes" with plausible events that could have occurred. When this happens, psychologists say that you have constructed a false memory. Hypnosis increases the likelihood of constructing false memories and may give people a false sense of confidence in the accuracy of these "retrieved" memories (McConkey, 1992). Many courts now recognize the significant problems associated with using "hypnotically refreshed" memories and have banned testimony from witnesses who have been hypnotized (Druckman & Bjork, 1994; Gibson, 1995; McConkey, 1995).

Hypnosis and Memory

The use of hypnosis to retrieve memories is controversial. Will this police hypnotist help the witness accurately recall the details of a crime or instead inadvertently suggest details that the witness will later be unable to distinguish from reality?

AP/WIDE WORLD PHOTOS

Psychology in THE REAL WORLD

Hypnosis and Pain Control

For a clear success story about the use of hypnosis, look no further than pain control. Here, there is solid evidence that hypnosis works. Holding your arm in ice water for 30 seconds or so generally produces intense discomfort. If you don't believe it, fill your sink with ice water and try it. Hypnotized people, however, report little pain under the same circumstances (Druckman & Bjork, 1994; Patterson, 2004). Apparently, they are able to separate themselves from the pain they are experiencing, much as an injured athlete may be able to set aside feelings of pain until after the competition ends.

These pain-management strategies have been applied to several real-life settings. For example, some dentists use light hypnosis to help their nervous patients relax and deal more effectively with discomfort. Hypnosis has also helped relieve chronic pain associated with arthritis, migraine headaches, and cancer (Hilgard, 1980; Long, 1986). These techniques may allow people to avoid painkilling drugs, which often have unwanted side effects such as dependence and the loss of mental sharpness.

AP/WIDE WORLD PHOTOS

Hypnotic Experience

Some dentists use hypnosis to help patients deal with anxiety and discomfort during dental procedures.

Other Hypnosis Claims Hypnosis has been used in a variety of therapeutic settings in which people have experienced relief with problems ranging from headaches to warts (Bowers, 1984). (See Psychology in the Real World: Hypnosis and Pain Control.) The problem is that we have no way of knowing for sure that hypnosis caused these improvements. Many studies have shown that people who receive treatment of *any* kind (even "sugar pills") tend to show more improvement than those who receive no treatment, thanks to the power of our positive expectations. This is called the **placebo** effect. Hypnosis may function as a type of placebo—producing an effect simply because people expect it to do so. For example, in the study in which hypnosis proved beneficial in getting rid of warts, a control group given positive suggestions *without* hypnosis showed similar improvement (Spanos, 1991).

Researchers are particularly skeptical of two types of claims for the power of hypnosis: feats of strength and age regression. A favorite trick of those who believe feats of strength can be achieved through hypnosis is to have someone stand on an individual who stretches rigid and plank-like between two chairs.

placebo An inactive substance or condition used to control for confounding variables.

BETTMANN/CORBIS

Age Regression?

The case of Bridey Murphy took hypnotic age regression to a new level in the 1950s. Murphy is a young Irish woman who "appeared" when a hypnotist regressed Virginia Tighe to a time before her birth, and Tighe began giving details of nineteenth-century life in Ireland. Is this evidence for reincarnation? Hardly. Investigators discovered that one of Tighe's childhood neighbors in Wisconsin was Bridey Murphy Corkell, who proved to be the source of much of the information Tighe reported when later hypnotized.

The problem is that this feat is also possible without hypnosis. *Age regression* under hypnosis is an attempt to turn back the clock to an earlier time in a person's life. Psychologists consider this feat equally unreliable. Hypnotically enhanced memories are not dependable. The hypnotist's suggestions could lead a person to unknowingly (but falsely) manufacture the regression to some earlier time. This happened in one study that tried to demonstrate how participants could be regressed to the day of their fourth birthday party, at which point they could remember the day of the week with great accuracy (True, 1949). A follow-up analysis revealed that typical 4-year-olds don't even know what day of the week it is. The hypnotist in this case was actually communicating the correct answer to his participants by asking the days of the week in order ("Is it Monday? Is it Tuesday?") (Orne, 1982). Because the hypnotist knew the correct answer, he may have inadvertently signaled that answer to the participants with slight changes in the inflection of his voice. In any case, hypnotic age regression could not have led the individuals to the correct answer because, as 4-year-olds, they wouldn't have known it.

Hypnosis remains one of the more fascinating topics studied by psychologists. Researchers may disagree on the "best" theory for explaining hypnosis, but they agree on one thing: We can be influenced by suggestions. With that in mind, please now think the following thoughts to yourself: "Things are going quite well today. I'm enjoying my psychology class. The time I spend studying will be effective and productive!"

PAUSE NOW OR MOVE ON

Turn to page 186 to review and apply what you've learned.

Relaxation and Meditation

WHAT'S THE POINT?

10-5 What are some benefits of relaxation and meditation?

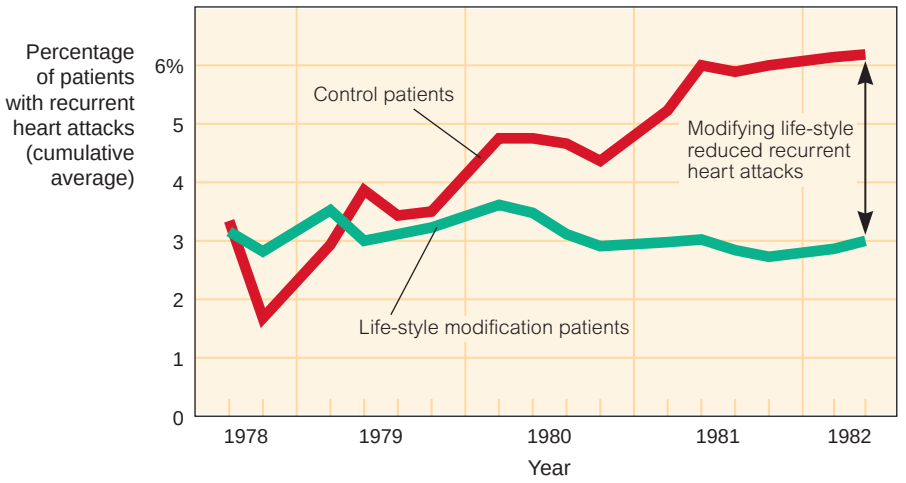
Can we use conscious control of our bodies and our thoughts to improve our lives? The answer is *Yes*. *Relaxation,* a state of calm, occurs when physical measures like muscle tension, breathing, blood pressure, and heart rate

decline. One way of achieving this is through using meditation to control one's thoughts. These simple methods, such as focusing on breathing or a particular sound or image, require no equipment, no technology, and no medicine yet can relieve headaches, high blood pressure, anxiety, and sleep difficulties (Nestoriuc et al., 2008; Stetter & Kupper, 2002). In our busy lives, however, we often fail to take advantage of these timeless techniques to enhance well-being.

Sometimes, however, using these techniques can be the difference between life and death. One experiment studied driven, middle-aged males who had survived heart attacks. All of them learned about medications, diet, and exercise, but only some were encouraged to slow down, relax, smile, enjoy life, and renew their religious faith. Did these life-style changes make a difference? Indeed, as you can see in **Figure 10.3,** only half as many of the life-style change group experienced repeat heart attacks (Friedman & Ulmer, 1984).

Meditation techniques that provide an opportunity to control one's thoughts and body can be a powerful pathway for creating positive change. Given their years of meditation experience, it is perhaps not surprising that Buddhist monks demonstrate beneficial changes while meditating. However, one study showed that some of these changes—including improved immune and brain function—were also apparent in people who had been given only eight weeks of instruction in meditation (Davidson et al., 2003). Another study provided meditation instruction to some elderly patients but not to others. After three years, all of the meditators were still alive, but a quarter of the nonmeditators had died (Alexander et al., 1989).

And now it's time to take a deep breath, relax, and marvel at all your mind can accomplish—both consciously and unconsciously.



RONNIE KAUFMAN/LARRY HIRSHOWITZ/BLENDIMAGES/ALAMY IMAGES

Figure 10.3
Relaxation and Heart Attacks

Men who survived heart attacks were much less likely to have a second heart attack if they had been taught life-style changes, including relaxation (From Friedman & Ulmer, 1984).

PAUSE NOW OR MOVE ON

Turn to page 187 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 10

Thinking About Hypnosis and Other States of Consciousness

States of Consciousness

WHAT'S THE POINT?

10-1 How does dual processing help explain differing states of consciousness?

- It is the nature of consciousness to process information on two tracks.
- Dual processing can result in change blindness and may be related to hypnosis.

Apply What You Know

1. True or False: Dual processing allows us to consciously think about two different things at the same time.
2. An example of information that we process unconsciously is _____.

Hypnosis

What Is Hypnosis?

WHAT'S THE POINT?

10-2 Is hypnosis really a different state of consciousness?

- Hypnosis is a social interaction in which a hypnotist makes suggestions about perception, feelings, thoughts, or behaviors and the person experiencing hypnosis follows those suggestions.
- Social influence theory argues that powerful social influences can produce a state of hypnosis.
- Divided consciousness theory states that our consciousness splits during hypnosis so that one aspect of consciousness is not aware of the role other parts are playing.

Apply What You Know

3. True or False: Social influence theory views hypnosis as an altered state of consciousness.
4. A difference between the two theories of hypnosis is that social influence theory sees hypnosis as governed by _____ forces and divided consciousness theory sees hypnosis as governed by _____ forces.

   a. external; internal
   b. cognitive; behavioral
   c. suggestive; biological
   d. natural; supernatural

Hypnosis Techniques

WHAT'S THE POINT?

10-3 How powerful are hypnotic suggestions?

- Hypnosis can lead people to follow many kinds of suggestions (even actions they otherwise wouldn't perform), but so can powerful suggestions of any kind.

Apply What You Know

5. Briefly describe three suggestions that might be acted upon under the influence of hypnosis.
6. While hypnotized, Kristi is told she will stand on one foot when she hears the word *flamingo*. After hypnosis, Kristi does stand on one foot when the hypnotist says *flamingo*. This is an example of

   a. divided consciousness.
   b. social influence theory.
   c. posthypnotic suggestion.
   d. posthypnotic amnesia.

Applications of Hypnosis

WHAT'S THE POINT?

10-4 Can hypnosis improve our memory or our physical state?

- In some cases, hypnosis has helped people retrieve memories, but hypnotized people may

inadvertently manufacture untrue details or false memories.

- Hypnosis has been used in a variety of therapeutic settings to treat various medical problems, but it is difficult to separate the effects of hypnosis from a placebo effect.
- Research does not support claims for the power of hypnosis to increase strength or for age regression (remembering events from much earlier in a person's life).

Apply What You Know

7. True or False: Hypnosis is not a reliable method for recovering lost memories.
8. The most supported use of hypnosis in medicine is for the control of _____.

Relaxation and Meditation

WHAT'S THE POINT?

10-5 What are some benefits of relaxation and meditation?

- Relaxation and meditation can lead to a wide variety of physical and psychological benefits, perhaps even including a longer life span.

Apply What You Know

9. _____ is a state of calm produced when physical measures like breathing rate decline.
10. True or False: Relaxation has proven beneficial for headaches and high blood pressure but not for sleep difficulties.

KEY TERMS AND KEY PEOPLE

consciousness, p. 175
dual processing, p. 176
hypnosis, p. 177
social influence theory, p. 178
divided consciousness theory, p. 178
posthypnotic suggestion, p. 181
placebo, p. 183
Ernest Hilgard (1904–2001), p. 178

DOMAIN 3

Development and Learning

Life-Span Development

MODULE 11 Prenatal and Childhood Development

MODULE 12 Adolescence

MODULE 13 Adulthood and Aging

Learning and Language

MODULE 14 Classical Conditioning

MODULE 15 Operant Conditioning

MODULE 16 Observational Learning

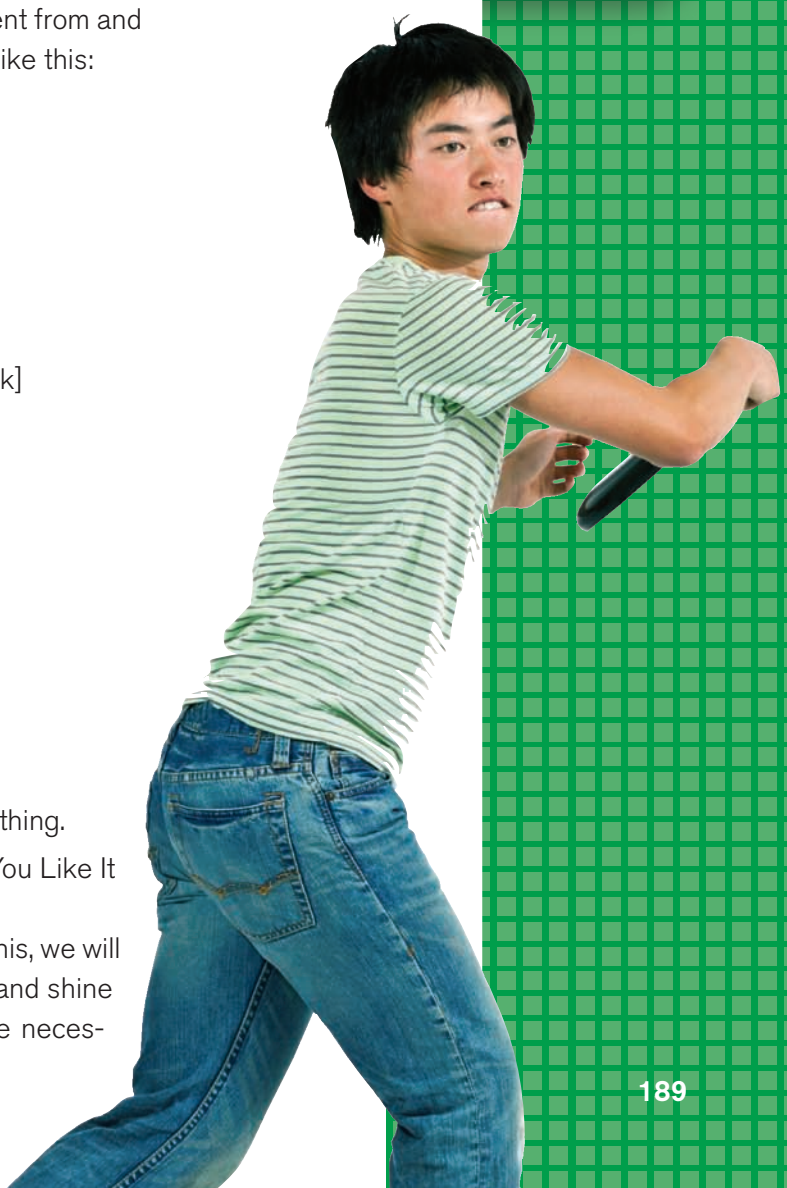
MODULE 17 Language Development

Our next domain, Development and Learning, consists of seven modules. We begin by exploring the developmental growth processes occurring throughout the life span. From womb to tomb, you will see how one individual's development is different from and similar to that of another. William Shakespeare said it like this:

All the world's a stage,
And all the men and women merely players.
They have their exits and their entrances,
And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling [crying] and puking in the nurse's arms.
Then the whining schoolboy, with his satchel [backpack]
And shining morning face, creeping like a snail
Unwillingly to school. And then the lover,
Sighing like [a] furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths . . . And then the justice,
In fair round belly. . . . The sixth scene shifts
Into the lean and slippered pantaloon [old man],
With spectacles on nose. . . . Last scene of all,
That ends this strange, eventful history,
Is second childishness and mere oblivion,
Sans [without] teeth, sans eyes, sans taste, sans everything.

—*Adapted from William Shakespeare's* As You Like It

To play our parts, we all need to learn our lines. For this, we will turn our attention to the various ways learning occurs and shine a particular spotlight on the development of language necessary to get our show on the road.



Life-Span Development

MODULES

11 Prenatal and Childhood Development

12 Adolescence

13 Adulthood and Aging

You are physically different than you were five or six years ago. If you compare your sixth-grade photo to a current one, you might even find the differences startling. These physical changes are obvious because you can see them. But you also differ in ways that are not visibly obvious. You think differently than you did in grade school, and your emotions are more developed. Psychologists interested in these kinds of changes research *developmental psychology,* which studies physical, cognitive, emotional, and social changes throughout the life span.

The next three modules explore three different periods of development, but they share a common theme. The research presented in all three modules focuses on three fundamental issues in developmental psychology:

1. **Continuity and stages**—Is development a gradual, continuous process, like a ski lift moving up a mountain, or is it a series of distinctly different stages, like the steps of a staircase?

2. **Stability and change**—Will the person you think of as the "real" you still be there in 2050, or will that person change dramatically as you move through adulthood?

3. **Nature and nurture**—How much of our development is a result of genetics (our nature), and how much is a result of environment (the nurturing we receive)?

We search for answers to these questions in the next three modules as we look at prenatal and childhood development, adolescence, and adulthood.

MODULE 11

Prenatal and Childhood Development

Whether learning to talk or learning how to put your toys away, growing up is not exactly child's play.

You are a genetic and environmental marvel. It only took you about 9 months to grow from the size of the dot on this *i* to a full-size (more or less) newborn baby. From the moment the egg from your mother and the sperm cell from your father united until the minute you were born, the cells that became you progressed through a delicate, predictable, and fantastic sequence of events. This sequence is virtually the same for all of us.

The Beginnings of Life
- Prenatal Development
- The Newborn

Physical Development in Infancy and Childhood
- The Developing Brain
- Motor Development

Cognitive Development in Infancy and Childhood
- Sensorimotor Stage
- Preoperational Stage
- Concrete Operational Stage
- Formal Operational Stage
- Assessing Piaget

Social Development in Infancy and Childhood
- Attachment
- Effects of Attachment
- Parenting Patterns

Three Key Developmental Issues
- Continuity and Stages
- Stability and Change
- Nature and Nurture

zygote A fertilized egg.

genes The biochemical units of heredity that make up chromosomes.

embryo A developing human organism from about 2 weeks after fertilization through the end of the eighth week.

The Beginnings of Life

WHAT'S THE POINT?

11-1 How do humans grow from single cells into newborns?

If you are a young woman, you were born with all the egg cells you'll ever have, although they were immature when you were just a baby. Only about 1 of every 5000 egg cells will mature and be released from an ovary. If you are a young man, you did not begin producing sperm cells until you reached puberty, but you'll keep producing them until you die. Although the rate slows with age, you will produce nearly 2 million sperm cells in the 30 minutes you take today for lunch, a rate of about 1000 per second.

Prenatal Development

Prenatal literally means before *(pre-)* birth *(-natal)*. The prenatal stage of development starts at conception and ends at birth.

A newly fertilized egg is called a **zygote.** Not even one in two zygotes makes it past the first 14 days (Grobstein, 1979; Hall, 2004). Luckily, you and I survived that risky period. A lot happens during those 2 weeks. First, the single-cell zygote begins to divide into identical cells; one cell becomes two, and two become four. In the first week, after dividing about seven times, the cells start to *differentiate,* to specialize in function. For example, some cells develop into a brain, and others develop into lungs or a heart. **Genes**—the biochemical units of heredity—direct this process of differentiation.

Around the tenth day, the zygote attaches to the mother's uterine wall, where it will stay for about 37 weeks. But when the developing human organism passes the 14-day milestone, it is no longer known as a *zygote;* it is now an **embryo,** the developing human organism from about 2 weeks after fertilization through the end of the eighth week (see **Figure 11.1**). The

Circle of Life

"Of all the joys that brighten suffering earth, what joy is welcomed like a newborn child?" Caroline Norton (1808–1877).

KWANE ZIKOMO/SUPERSTOCK

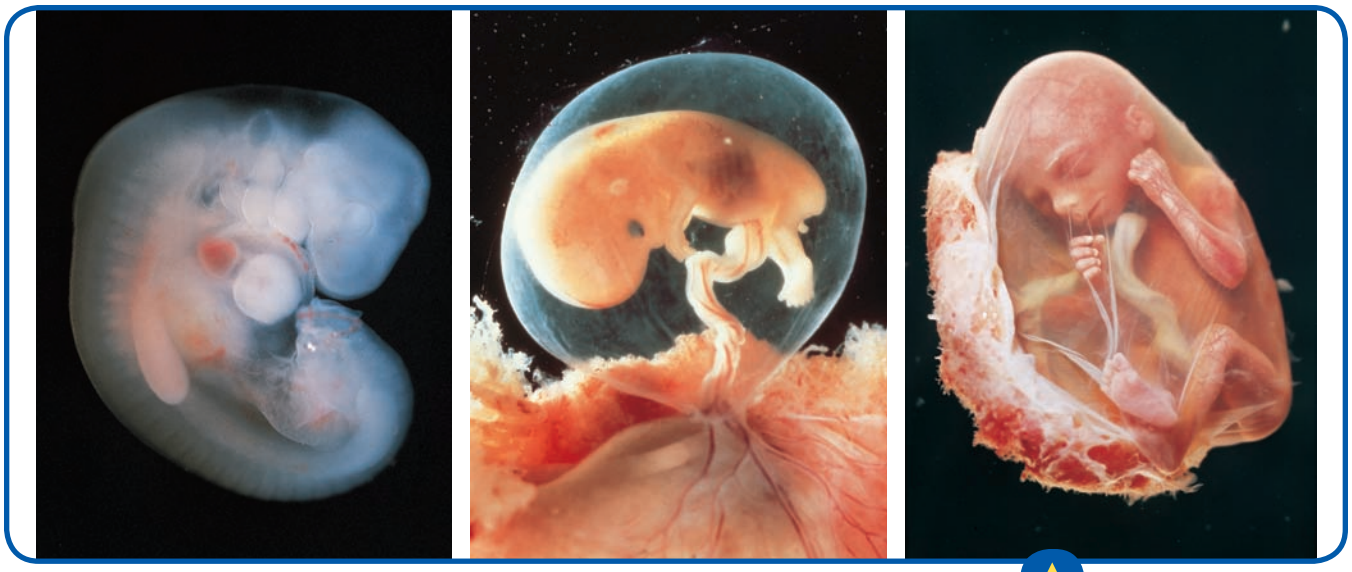


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Figure 11.1
Nine Weeks After Conception

At 9 weeks, the developing organism becomes a fetus and is unmistakably human in form. Facial features, hands, and feet are visible at this time.

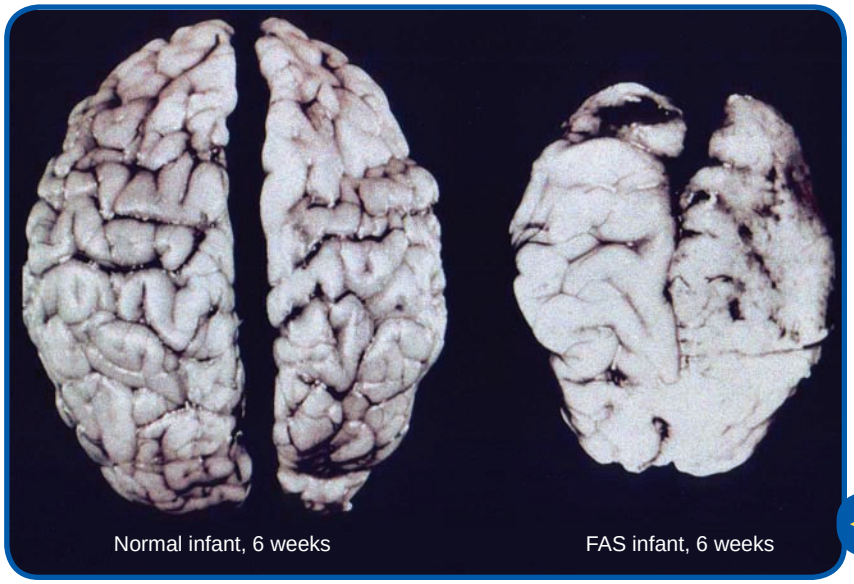
embryo has a noticeable heartbeat and red blood cells produced by its own liver. Most of the body's major organs will have formed by the end of the embryonic stage.

At 9 weeks, the developing organism enters the fetal period. A **fetus** is the developing human organism from 9 weeks after conception to birth. It is unmistakably human in form. Fetuses born prematurely at the end of 6 months have organs that are developed enough to provide a chance at survival.

But let's not hurry things. While still in the mother's body, the fetus receives oxygen and nutrients from the *placenta,* a cushion of cells that also screens out some substances that could harm the fetus. Unfortunately, the placenta is not a perfect screen, and some viruses, toxins, and drugs do slip through. **Teratogens** are substances that cross the placental barrier and prevent the fetus from developing normally.

fetus A developing human organism from 9 weeks after conception to birth.

teratogens Substances that cross the placental barrier and prevent the fetus from developing normally.



DR. STERLING CLARREN MD

Fetal Alcohol Syndrome

Symptoms of fetal alcohol syndrome (FAS) include distinctive facial misproportions such as a short, upturned nose; a sunken nasal bridge; and small eyelid openings. If his mother had stayed free of alcohol during her pregnancy, this child would not have been born with FAS. (From MayoClinic.com, 2006.)

fetal alcohol syndrome (FAS) Physical and cognitive abnormalities that appear in children whose mothers consumed large amounts of alcohol while pregnant.

rooting reflex A baby's tendency, when touched on the cheek, to open the mouth and search for the nipple.

Teratogens take many forms. Radiation, toxic chemicals in the water or air, or viruses like German measles can harm a fetus, as can some prescription and over-the-counter drugs. Other teratogens include nicotine, alcohol, and the viruses associated with sexually transmitted infections (STIs). Women who smoke during pregnancy increase the risk of abnormal fetal heartbeat, premature birth and its related complications, and miscarriage (Slotkin, 1998). The effects of alcohol on a fetus can be even more dramatic. There is no known "safe" quantity of alcohol to consume while pregnant, and even moderate drinking can damage a fetus's brain (Braun, 1996). Children whose mothers drink heavily during pregnancy may be born with **fetal alcohol syndrome (FAS).** The cognitive abnormalities that appear in children whose mothers consumed large amounts of alcohol while pregnant can result in lifelong struggles. Physical symptoms of FAS may include a small, misproportioned head and unusual facial features. Mothers may also transmit STIs to their unborn children. Pregnant women with STIs are more likely than other women to have babies with mental disabilities and blindness (Bee, 1997).

As frightening as teratogens are, most fetuses survive their 9 months in the womb and enter the world as healthy newborns.

The Newborn

If left to fend for themselves shortly after birth, infants would not survive. However, newborns are not passive little bundles who don't notice the world around them.

Within the first half hour of life, infants will turn their heads to watch a picture or drawing of a human face, but they will not turn their heads to view an indistinguishable jumble of images (Johnson et al., 1991; Mondloch et al., 1999). Newborns also turn their heads toward human voices, and they have definite taste preferences. Sugar water and mother's milk? Yes, please! Milk with a spoiled taste or smell to it? No, thanks!

Newborns don't have to learn sucking, swallowing, or grasping. These *reflexes* (automatic, unlearned responses) are survival behaviors, and nearly every baby comes equipped with them. To help find the breast or bottle that supplies nourishment, newborns have a **rooting reflex,** a baby's

Reflexes in Newborns

Stroking this baby's cheek initiates the rooting reflex as the baby searches for something to suck (left). The grasping reflex allows this newborn (right) to support its own weight. This reflex disappears by the baby's first birthday.

CATHY MELLOAN RESOURCES/PHOTOEDIT — ALL RIGHTS RESERVED.

PETIT FORMAT/PHOTO RESEARCHERS, INC.

tendency, when touched on the cheek, to open the mouth and search for the nipple.

But newborns don't just roll off the assembly line, any one interchangeable with another. Even in the first few hours of life, a baby's **temperament**—characteristic emotional excitability—is evident. In the weeks following birth, an "easy" baby displays predictable sleeping and eating patterns, appears relaxed, and is cheerful. During these same weeks, a "difficult" baby is unpredictable, intense, and irritable. And the "slow-to-warm-up" baby will avoid new situations, have relatively low activity levels, and take more time to adapt to something new (Chess & Thomas, 1987). Temperament appears to be tied to our genetic makeup (Rothbart, 2007). Studies showing how identical twins have more similar temperaments than fraternal twins suggest that our biologically based temperament sets the stage for our personalities (Fox et al., 2007).

Temperament is also a relatively stable personality aspect. The most intense preschoolers grow up to be intense young adults (Larsen & Diener, 1987). Inhibited, fearful 2-year-olds generally become shy second graders (Kagan et al., 1994).

temperament A person's characteristic emotional excitability.

maturation Biological growth processes that enable orderly changes in behavior.

PAUSE NOW OR MOVE ON

Turn to page 210 to review and apply what you've learned.

Physical Development in Infancy and Childhood

WHAT'S THE POINT?

11-2 How do genes and early experiences affect infant and child development?

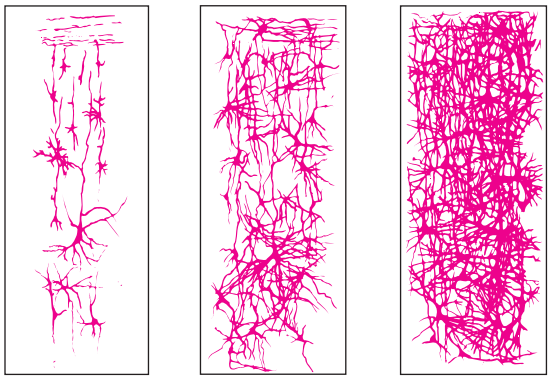
Infancy is the first year of a child's life. From about 1 year to 3 years of age, a child is a toddler. Childhood includes the years between toddler and teenager. From infancy through childhood, we develop at an amazing pace on many fronts—physically, cognitively, emotionally, and socially. Let's look first at physical development during this early part of life.

The Developing Brain

During prenatal development, your body made nerve cells at the rate of 4000 per *second*. With your first breath of air, your brain cells were where they needed to be, but your nervous system was still immature. You could not walk, talk, or remember as you now do because your brain had not yet formed the neural networks that would let you perform these behaviors. In part, these neural networks, which continue developing even in adolescence, were a result of **maturation**—the biological growth processes that enable

Figure 11.2
Neural Development

These drawings show how the brain's neural networks grow increasingly more complex as a child matures. Complex activities such as problem solving and reasoning are among the last areas to mature. (From National Institute of Mental Health, 2004.)



orderly changes in behavior. Experience has little effect on maturation. You rolled over, sat up, walked, and learned to run based largely on your genetic blueprint, and no amount of experience can change that. However, experience does affect *development*. Parents who talk and read to their children foster neural connections that help reading skills develop (see **Figure 11.2**). Those who abuse and neglect their children also deprive them of these complex neural connections and hinder development.

From ages 3 to 6, the most rapid neurological growth appears to be in the part of the brain responsible for thinking rationally. Indeed, preschoolers often show amazing growth in their ability to behave and pay attention to a leader (Garon et al., 2008).

To see how maturation affects memory, try to remember anything about your first birthday party, or try to remember wearing diapers. Any luck? If you're like most of us, the answer is *No*. We can't remember much before about the age of 3, and we remember little that happened during ages 3 through 5 because we did not have the neural connections in our brains that allow us to remember. Elizabeth Loftus (1996) uses a computer example to explain this. In a way, trying to remember things that happened before age 5 (over a decade for you) is like trying to open the assignment you just wrote using word-processing software from the 1990s. Good luck with that!

So, do our memories function when we are very young? Yes, but in different ways:

- One-year-olds will imitate the making of a rattle (putting a button in a box) 3 months after observing this act (Mandler & McDonough, 1995).
- Three-year-olds recognize an out-of-focus picture more quickly if they saw a clear version of the picture 3 months earlier (Drummey & Newcombe, 1995).
- Most 10-year-olds say they recognize only one in five of the classmates they have not seen since preschool. But their physiological responses (measured as skin perspiration) are greater to former classmates, even to those they claim they don't recognize. The nervous system remembers what the conscious mind does not (Newcombe & Fox, 1994).

The parts of the brain dealing with memory continue to develop well into the teen years (Bauer, 2007).

Motor Development

Physical skills and muscular coordination are products of the developing brain. The neural pathways and muscles necessary for crawling (or scooting on your bottom) mature before the pathways and muscles for walking. We all walk before we run because we are developmentally ready to walk before we are ready to run (see **Figure 11.3**).

Unfortunately, developmental charts that show "normal" ages for crawling, standing, and walking haunt some new parents. I've seen parents trying to force their child to crawl, ignoring the baby's tearful protests, as a "deadline for normal behavior" approached. Here's some good advice you can give if you see a parent prodding a child to "catch up": Relax! Developmental charts provide age *ranges*. In this country, 25 percent of the babies walk at 11 months. Within a week of their first birthday, 50 percent are walking, and almost all of the remaining 50 percent will walk sometime shortly thereafter. The child's brain creates the readiness for crawling or walking, not the parents' prodding. The same holds true for all physical skills, including bladder and bowel control. Before a baby achieves the needed neural and muscular maturation, no amount of begging, bribing, or scolding will accomplish toilet training. Knowledge of this fact helped me potty train

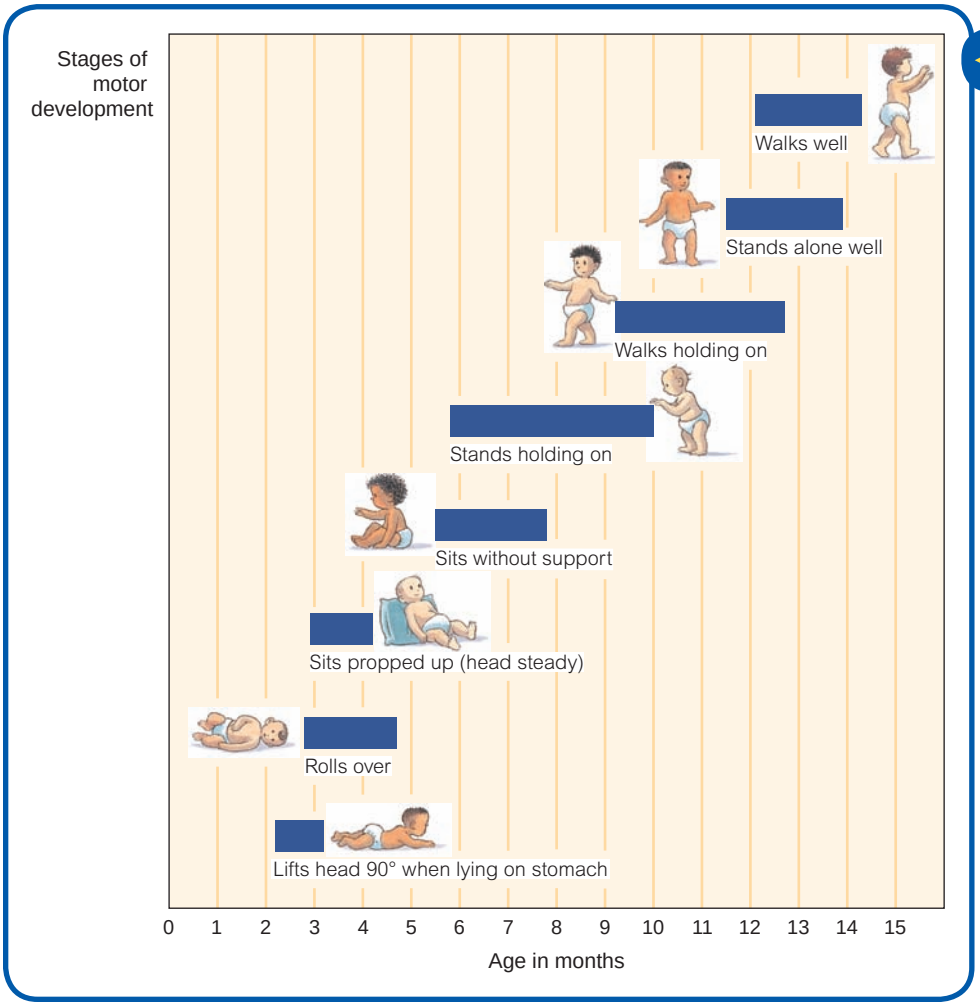

Stages of motor development
Walks well
Stands alone well
Walks holding on
Stands holding on
Sits without support
Sits propped up (head steady)
Rolls over
Lifts head 90° when lying on stomach
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Age in months

Figure 11.3
Motor Development

Some infants reach each milestone sooner or later than others, but the order of the stages is the same for all infants. The colored bars show developmental norms—the ages at which infants master the motor skill. The left end of the bar indicates the age by which 50 percent have mastered the movement. The right end of the bar indicates the age by which 90 percent have mastered the movement.

my daughters (when they were ready, not when I was ready) in a few days instead of a prolonged period of several months.

PAUSE NOW OR MOVE ON

Turn to page 211 to review and apply what you've learned.

Cognitive Development in Infancy and Childhood

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JEAN PIAGET [pee-ah-ZHAY] (1896–1980)
Pioneer in the study of developmental psychology who introduced a stage theory of cognitive development that led to a better understanding of children's thought processes.

WHAT'S THE POINT?

11-3 How does Jean Piaget's theory of cognitive development describe how children think at specific cognitive stages?

Few people have had a greater impact on **developmental psychology** than Swiss psychologist **Jean Piaget** (pronounced pee-ah-ZHAY). In 1920, Piaget was working on intelligence tests to determine the age at which children were likely to answer questions correctly. However, Piaget became interested in the *incorrect* responses children gave, cleverly realizing there was a lot to learn from wrong answers. Children at a given age were making remarkably similar mistakes.

Over the next 50 years, Piaget (1930) advanced the belief that the way children think and solve problems depends on their stage of cognitive development. **Cognition** refers to all mental activities associated with thinking, knowing, and remembering. Children know less than you and I know, but they also think *differently*. Trying to explain to a 3-year-old how you exchange pretend money for property gets you nowhere. Tell an 8-year-old that Boardwalk costs $400 and you're playing Monopoly. But given your more advanced reasoning skills, that same 8-year-old will not stand much of a chance against you if you're playing a game of strategy.

Piaget wrote that all people, even infants, constantly face and adapt to environmental challenges. We do so by developing **schemas** (sometimes called *schemes*), which are concepts or mental frameworks that organize and interpret information. As a toddler, for example, your schema for getting food may have been to pull on the pant leg of the nearest adult or to start to cry. By now you have countless schemas, from how to start the car to how to go about asking someone to watch a movie with you. How did you develop all of these helpful mental plans? Piaget's answer would be that you used two different experiences:

- **Assimilation**—Interpreting your new experiences in terms of your existing schemas
- **Accommodation**—Adapting your current schemas to incorporate new information

developmental psychology A subfield of psychology that studies physical, cognitive, and social change throughout the life span.

cognition All mental processes associated with thinking, knowing, and remembering.

schemas Concepts or mental frameworks that organize and interpret information.

assimilation Interpreting new experience in terms of existing schemas.

accommodation Adapting current schemas to incorporate new information.

Two-year-old Jocelyn has learned the schema for *dog* from her picture books.

Jocelyn sees a cat and calls it a "dog." She is trying to assimilate this new animal into an existing schema. Her mother tells her, "No, it's a cat."

Jocelyn accommodates her schema for four-legged animals and continues to modify that schema to include different kinds of dogs and cats in the neighborhood.

Figure 11.4
Assimilation and Accommodation

These experiences allow children to make sense of their worlds either by interpreting new information with existing schemas or by changing a current schema.

Children assimilate and accommodate all the time. Consider a 2-year-old, whose simple schema for *doggie* is *four-legged animal*. This concept works wonderfully for all the dogs in the neighborhood, but not for cats. The toddler must accommodate or modify her schema to account for four-legged animals that are not doggies (see **Figure 11.4**).

In addition to explaining how we form plans to organize and interpret information, Piaget proposed that we all pass through four separate stages of cognitive development on our journey from childhood to adulthood. **Table 11.1** outlines Piaget's sensorimotor, preoperational, concrete operational, and formal operational stages.

Table 11.1

Piaget's Stages of Cognitive Development

Typical Age Range	Description of Stage	Key Developmental Events
Birth to nearly 2 years	***Sensorimotor*** Experiencing the world through senses and actions (looking, touching, mouthing, and grasping)	• Object permanence
About 2 to 6 or 7 years	***Preoperational*** Representing things with words and images but lacking logical reasoning	• Pretend play • Egocentrism • Language development
About 6 or 7 to 11 years	***Concrete operational*** Thinking logically about concrete events; grasping concrete analogies and performing arithmetical operations	• Conservation • Mathematical transformations
About 12 through adulthood	***Formal operational*** Abstract reasoning	• Abstract logic • Potential for mature moral reasoning

sensorimotor stage In Piaget's theory, the stage (from birth to about 2 years of age) during which infants learn about the world through their sensory impressions and motor activities.

object permanence The awareness that things continue to exist even when you cannot see or hear them.

Sensorimotor Stage

According to Piaget, during the **sensorimotor stage** (from birth to about age 2) infants learn about the world through their sensory impressions and motor activities. Infants gain information by mouthing, grasping, looking, hearing, and touching—and this is how they develop their schemas.

Infants focus on things they can perceive through their senses. At first, the things they couldn't see or hear did not exist. But eventually, infants develop **object permanence,** the awareness that things continue to exist even when you cannot see or hear them. You can test this idea yourself if you know a child who is about 8 months old. Hide one of the child's favorite toys behind your back and watch what happens. If the baby crawls around you to get the toy, you're witnessing object permanence. If the child simply sits and looks away, this little person has probably not yet developed object permanence.

Piaget assumed object permanence was not possible until around 8 months of age, but research indicates that he underestimated a young child's abilities. Piaget did not think children could think or deal with abstract ideas, but other researchers have produced evidence of early logical thinking. Consider the following:

- One-month-old babies were allowed to suck on one of two pacifiers without looking at either (see **Figure 11.5**). Later, when the infants were shown the same two pacifiers, they looked primarily at the pacifier they had *felt* in their mouth, indicating the memory necessary for object permanence (Meltzoff & Borton, 1979). This study was later repeated with babies just 12 hours old, with similar results (Kaye & Bower, 1994).
- At 5 months of age, babies stare longer or do "double takes" at impossible situations (Wynn, 1992, 2000). The example in **Figure 11.6** shows how researchers observed this behavior. Infants also show surprise when a puppet that usually jumps three times then jumps only twice (Wynn, 1998). Piaget would not have predicted that such young children could show either numerical thinking skills or cognitive awareness of change.

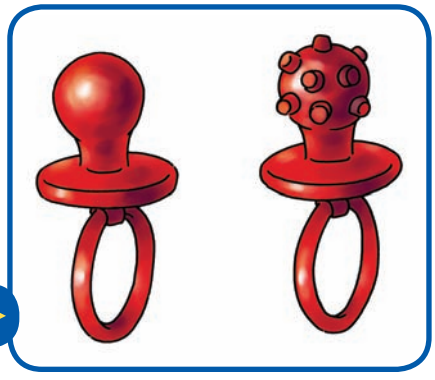

Figure 11.5
Early Memories

After sucking on one of these two pacifiers, babies looked longer at the pacifier they had felt in their mouth. This is evidence of early logical thinking. (From Meltzoff & Borton, 1979.)

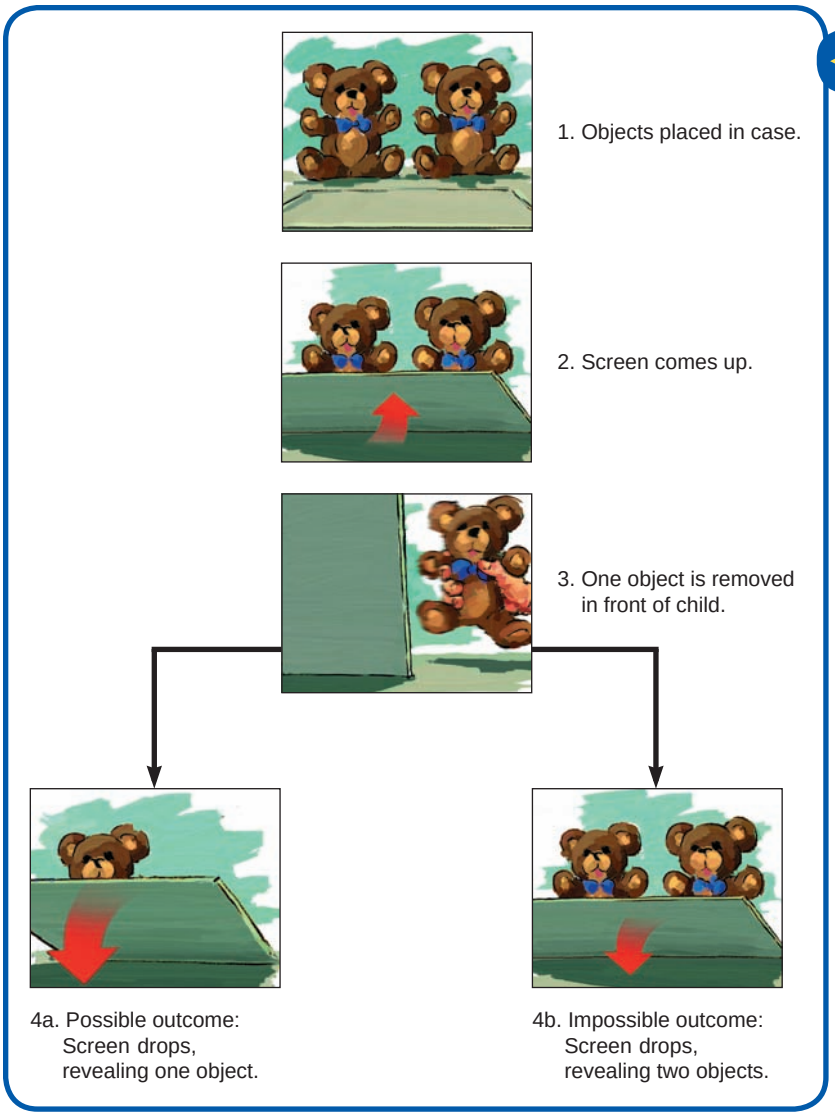
1. Objects placed in case.
2. Screen comes up.
3. One object is removed in front of child.
4a. Possible outcome: Screen drops, revealing one object.
4b. Impossible outcome: Screen drops, revealing two objects.

Figure 11.6
Early Object Permanence

When shown a numerically impossible outcome (there still being two objects after watching one being taken away), 5-month-old infants stare longer at the two objects, a finding that supports the development of object permanence far earlier than Jean Piaget assumed. (From Wynn, 1992.)

Preoperational Stage

Piaget defined the **preoperational stage** (from about age 2 to about age 6 or 7) as a time during which a child learns to use language but cannot yet think logically. If you show 5-year-olds two identical, clear glass beakers, each with 1000 milliliters of blue liquid in them, they'll know the beakers hold the same amount. However, if you then pour the contents of one beaker into a taller, narrower beaker, causing the water line to move up, the children will probably tell you the new beaker now holds more liquid. Although the different-sized beakers hold the same amount of liquid, 5-year-olds typically focus only on the height dimension. These children lack an understanding of **conservation,** the principle that properties such as mass, volume, and number remain the same even if the object's form changes. Without this understanding, 5-year-olds do not have the cognitive skills to mentally pour the tall beaker's contents back into the regular beaker (see **Figure 11.7**).

preoperational stage In Piaget's theory, the stage (from about 2 to 6 or 7 years of age) during which a child learns to use language but cannot yet think logically.

conservation The principle (which Piaget believed to be a part of concrete operational reasoning) that properties such as mass, volume, and number remain the same despite changes in the forms of objects.

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Figure 11.7
Conservation Problem

Conservation is the principle that properties such as mass, volume, and number remain the same even if the object's form changes. The two beakers in the third panel clearly have the same amount of liquid, but a 5-year-old would probably not understand this conservation problem.

Preoperational children develop language skills, but their communication is often egocentric. **Egocentrism** is the inability to consider another's point of view. This means that preoperational children are likely to say whatever is on their minds without taking into account what others have said. Egocentrism shows up in the actions and statements of young children. For example, many years ago, my oldest daughter used to close her eyes when she didn't "want anybody to see her." Ask a 4-year-old why the sun shines in the morning and you might hear the answer, "To wake me up."

We've learned that taking another's viewpoint, a form of symbolic thinking, appears earlier in the preoperational mind than Piaget thought. In one study, 3-year-olds were able to use a scale model of a real room to locate a hidden stuffed animal. If "little Snoopy" was hidden under a pillow in the scale model, 3-year-olds knew to look under the pillow in the real room 80 percent of the time. However, only 30 percent of 2½-year-olds knew where to look for little Snoopy in the real room (DeLoache & Brown, 1987). Piaget did not see stage transitions as abrupt, and he probably would have been surprised that 6 months made such a difference in children's ability to use the scale model of a room as a symbol.

Concrete Operational Stage

Piaget believed that in the **concrete operational stage** (from about age 6 or 7 to about age 11) children gain the mental skills that let them think logically about concrete events. Concrete operational children comprehend that mass and volume stay the same despite changes in the forms of objects (a sign of understanding *conservation*). They know that change in shape does not affect quantity. Whether you roll a batch of dough into one big loaf of bread or divide it into a dozen rolls, a child at the concrete operational stage knows that you still have the same amount of dough.

In the concrete operational stage, Piaget said that children could also comprehend mathematical transformations. For example, they enjoy math-based jokes that used to be over their heads, like this one:

> A king asked his baker to bring him a pie. When the baker brought a pie cut in six pieces, the king yelled at the baker, "Why didn't you bring me a pie cut in two pieces? I could never eat six."

Obviously, that king can't conserve. Concrete operational children understand the joke (even if it's not that funny).

egocentrism In Piaget's theory, the inability of the preoperational child to take another person's point of view or to understand that symbols can represent other objects.

concrete operational stage In Piaget's theory, the stage of cognitive development (from about 6 or 7 to 11 years of age) during which children gain the mental skills that let them think logically about concrete events.

Formal Operational Stage

Preoperational?

Roger has not outgrown his early childhood egocentrism.

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"It's too late, Roger—they've seen us."

Concrete reasoning requires actual experience. In the **formal operational stage** (age 12 and over), people begin to think logically about abstract concepts and form strategies about things they may not have experienced. The ability to create and use the strategies necessary to play chess is a sign of formal operational thought. Think of the abstract reasoning necessary to understand chemical equations and the laws of physics. Concrete thinkers would struggle in these classes. Young adolescents, said Piaget, become capable of solving hypothetical problems. They can figure out the answer to "*If* this, *then* what" questions, such as the following: "Whenever Emily goes to school, Meredith also goes to school. Emily went to school. What can you say about Meredith?"

Every formal operational thinker knows that Meredith also went to school—but so do most 7-year-olds (Suppes, cited in Ennis, 1982), who do not fit Piaget's expected age range for this stage. Once again, recent research differs from Piaget's expectations; the mental skills that form the basis for Piaget's stages appear earlier than he predicted.

Assessing Piaget

We've seen that Piaget's pioneering research underestimated children's abilities in virtually every stage of his theory. Further, most developmental psychologists now believe development is fairly *continuous,* rather than divided into the discrete stages Piaget proposed. And Piaget's work did not reflect the effects of culture on cognitive development. For example, if you were raised in a cultural environment that made minimal use of numbers, your language might have number words only up to five; all numbers or quantities after that might simply be called "many." This type of language difference appears to delay the development of quantity conservation (Dasen, 1994).

Nevertheless, Piaget's identification of cognitive milestones broke new ground. Stimulated by his work, thousands of psychologists ran experiments on how the mind develops and wrote countless articles on the development of children. Piaget taught us that we learn best when the lesson builds on what we already know (schemas). He showed that new reasoning abilities require the stepping-stones of previous abilities. Furthermore, he taught us that children simply cannot reason using adult logic and that it is unrealistic to expect a 3-year-old to reason like a 7-year-old. Piaget provided a wonderful base on which other psychologists could build our current understanding of cognitive development.

formal operational stage
In Piaget's theory, the stage of cognitive development (beginning about age 12) during which people begin to think logically about abstract concepts and form strategies about things they may not have experienced.

PAUSE NOW OR MOVE ON

Turn to page 211 to review and apply what you've learned.

stranger anxiety The fear of strangers that infants commonly display, beginning by about 8 months of age.

Social Development in Infancy and Childhood

WHAT'S THE POINT?

11-4 What are the probable effects of attachment types and parenting styles?

Some friends recently called me to come over and watch their 9-month-old son take some wobbly steps as he was learning to walk. The excitement in their voices was clear: Baby Ethan was taking his first steps! When I arrived, Ethan's father was changing his son's diaper, so I sat for a moment waiting for the baby's grand entrance. His dad brought Ethan in, placed him in a standing position, and encouraged him to walk. However, much to the dismay of his parents, Ethan took one look at me and started crying loudly enough to make the dog get up and leave the room. The child then started grabbing at his father's legs, frantically trying to climb up to safety.

Now, I don't exactly think of myself as scary looking, but Ethan was frightened by what he saw. His reaction to me was normal for his age and was a classic sign of **stranger anxiety,** the fear of strangers that infants commonly display beginning around 8 months of age. Around this age, children have established schemas for familiar faces and often greet strangers with crying and distress. Ethan had not assimilated my face into any of his existing schemas.

Ethan's reaction shows how physical, cognitive, and social-emotional behaviors develop simultaneously. A few months later, I thought I should give Ethan another try. So, I invited Ethan's family to our house, and he was fine when he came in. Then Emily, my oldest daughter, made the mistake of reaching out her arms and asking, "May I hold you?" Ethan immediately tightened his grip on his mother and started saying, "No!" with plenty of volume. This time, Ethan was showing *attachment* to his mother. Let's take a closer look at attachment and its effects on development.

Stranger Anxiety

This 8-month-old seated with the man in the red suit is clearly experiencing stranger anxiety.

KATHY MCLAUGHLIN/THE IMAGE WORKS

Attachment

attachment The emotional tie with another person shown by seeking closeness to the caregiver and showing distress on separation.

Attachment is an emotional tie with another person, shown by seeking closeness to the caregiver and distress on separation. At least three elements contribute to the infant-parent bond that forms during attachment—body contact, familiarity, and responsiveness.

Body Contact

Which is more important to fostering attachment: being fed or being held? Are you more likely to become attached to the person who nourishes you or to the person who provides you *contact comfort?* For years, developmental psychologists thought this question was a no-brainer. Surely, providing nourishment is the way to an infant's heart. Then in the 1950s, psychologists Harry Harlow and Margaret Harlow tested this idea, using infant monkeys to assess whether food or contact comfort of something cuddly is more important for attachment.

In the experiment, the Harlows' infant monkeys could choose between two artificial mothers. One was foam rubber covered with soft terry cloth, and the other was a bare-wire cylinder. It was no surprise that if both "mothers" had a bottle attached for feeding, the baby monkeys preferred the soft, cuddly mother. But what if only the wire mother had the bottle? Which mother would the baby cling to when alarmed, or spend most of its time with? The Harlows surprised other psychologists (and parents) when they revealed that the infant monkeys preferred contact with the cuddly mother even while feeding from the wire mother (Harlow et al., 1971) (see **Figure 11.8**).

Attachment is not primarily a function of who provides the food. Human infants become attached to warm, soft parents who cuddle, rock, *and* feed. Early on, emotional communication between parent and infant takes place most often through touch. Snuggling soothes a baby, whereas tickling elicits smiles and laughter (Hertenstein et al., 2006).

Attachment provides an infant with a secure base from which to set out for wobbly explorations of the environment. Ethan needed the closeness of his mother, especially when he was stressed by the presence of someone he did not know. The attachment children experience has been shown to resurface when those children become parents themselves. Those who did not experience secure attachment are more likely to describe parenting as stressful and unsatisfying, which is the opposite of how securely attached children describe being a mother or father once they become parents (Rholes et al., 2006).

Attachment appears to play a role in our adult lives in other ways as well. Adults who experienced secure attachment as children are more driven to achieve and less likely to express a fear of failure (Elliot & Reis, 2003). Comfort with intimacy as an adult is also more often found in those who were securely attached as youngsters (Birnbaum et al., 2006). We still seek to maintain a secure base as we mature, although that base tends to become peers and partners (Cassidy & Shaver, 1999). As social creatures, we appear to have a greater chance of reaching our potential when we know a trusted friend or loved one will stand behind us, no matter what.

Figure 11.8
Out to Lunch

The Harlows' monkeys preferred the soft, comfortable "mother" to the bare wire, wooden-headed "mother," even though the wire model provided nourishment. This discovery, that attachment is formed more through comfort than through nourishment, surprised many psychologists.

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critical period The optimal period shortly after birth when an organism's exposure to certain experiences produces proper development.

imprinting The process by which certain animals form attachments during a critical period early in life.

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KONRAD LORENZ (1903–1989) Researcher who focused on critical attachment periods in baby birds, a concept he called imprinting.

Familiarity Body contact is one piece of the attachment puzzle; familiarity is another. My daughter and I were unfamiliar faces to Ethan, so he pulled back to the safety of his parents. For some species, the attachment bond forms during a **critical period**—an optimal period shortly after birth when an organism's exposure to certain experiences produces proper development. **Konrad Lorenz** (1937) found that a newborn duckling, chick, or gosling will follow the first moving object it sees, which would typically be the little creature's mother. This process, known as **imprinting,** is an adaptive response: Following and staying close to Mom provides safety and nourishment for these birds. Lorenz showed, however, that because of the critical period for attachment in baby birds, fledglings would also imprint on black boots with yellow stripes or on bouncing balls if either of those objects were the first thing they saw (Johnson, 1992). Ducklings that imprinted on the boots would follow those boots wherever they went, regardless of who was wearing them. Attachment in these animals is hard to reverse once established.

Do humans have a similar critical period for attachment? *No.* Humans do not imprint, and babies who are adopted days, weeks, or even months after birth can become every bit as attached to their new caregiver as any child does to its birth parents. Familiarity fosters contentment, but human attachment develops gradually.

Responsiveness The third element of the attachment bond is responsiveness. Responsive parents are aware of what their children are doing, and they respond appropriately. Unresponsive parents often ignore their babies, helping them only when they feel like it. Mary Ainsworth (1979) found that responsiveness appears to affect whether a child is securely or insecurely attached. *Securely attached* children happily explore their environment when their primary caregiver is around. If that caregiver leaves, they appear distressed, and they go to their caregiver as soon as he or she returns. *Insecurely attached* children are often "clingy" and are less likely to explore and learn about the environment. When their caregiver leaves, they either cry loudly or show indifference to the caregiver's departure and return.

Dutch researcher Dymphna van den Boom (cited in Hazan & Shaver, 1994) designed a study to assess the role of the environment in attachment. She took 100 temperamentally difficult infants and randomly assigned half to a group in which their mothers received training on how to be a responsive caregiver and half to a group where the mothers received no training. When the children reached their first birthday, van den Boom assessed their attachment to their mothers. A whopping 68 percent of the children whose mothers received training were deemed securely attached. Only 28 percent of the children in the other group were securely attached. Responsiveness matters.

Effects of Attachment

Does what we learn in the cradle last to the grave? Said differently, does secure or insecure attachment have long-term effects, or do these terms simply describe some bonds and behaviors limited to our early childhood? Consider the following:

- *Secure attachment predicts social competence.* Children identified as securely attached between 12 and 18 months of age were more outgoing, more confident, and more persistent in solving challenging tasks when restudied as 2- and 3-year-olds (Sroufe et al., 1983).
- *Deprivation of attachment is linked to negative outcomes.* Babies who grow up in institutions without a caregiver's regular stimulation and attention do not form normal attachments and often appear withdrawn and frightened (Carlson, cited in Blakeslee, 1995). Physical and emotional abuse often disrupts attachment as well. While most abused children show great resilience and do not grow up to be violent criminals or abusive parents, most abusive parents were, in fact, battered or emotionally abused as children (Kempe & Kempe, 1978).
- *A responsive environment helps most infants recover from attachment disruption.* Children who have been neglected but who are later adopted, between 6 and 16 months of age, at first have trouble sleeping, eating, and relating to their new parents (Yarrow et al., 1973). However, by age 10, this same group of adopted children showed virtually no adverse effects from the early neglect.

The evidence is consistent and clear. Children who have a warm relationship with familiar, responsive caregivers reap the benefits of secure attachment. Most often, attachment is a direct result of the parenting children receive. As long as parents are responsive, does their parenting *style* matter? Let's take a look.

Parenting Patterns

Roughly 9 in 10 people your age eventually wind up raising a child. Assume for a moment that you are the parent of a 2-year-old. What kind of parent are you? Do you spank? Try to talk everything out? Are you strict? Permissive? How will your parenting style affect your child's development?

Diana Baumrind (1971, 1996) was the first to describe the three main parenting styles—authoritarian, permissive, and authoritative—and their characteristics (see **Figure 11.9**):

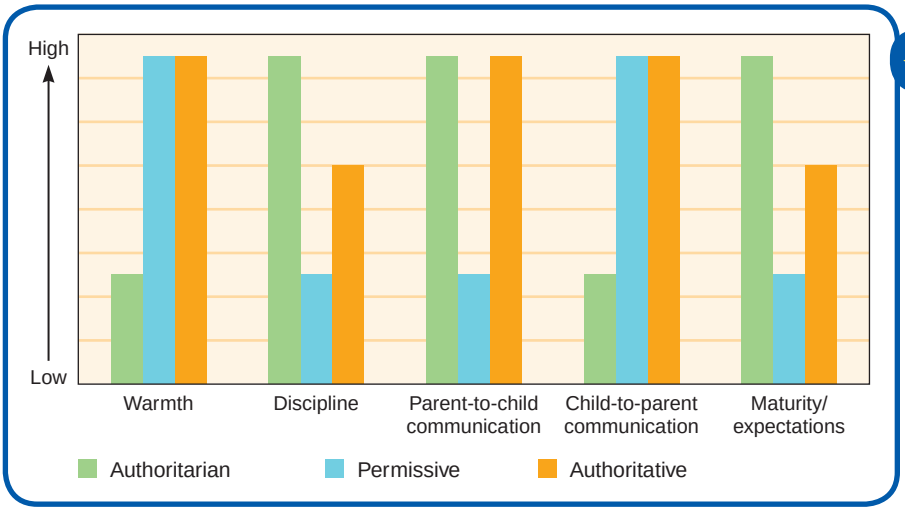


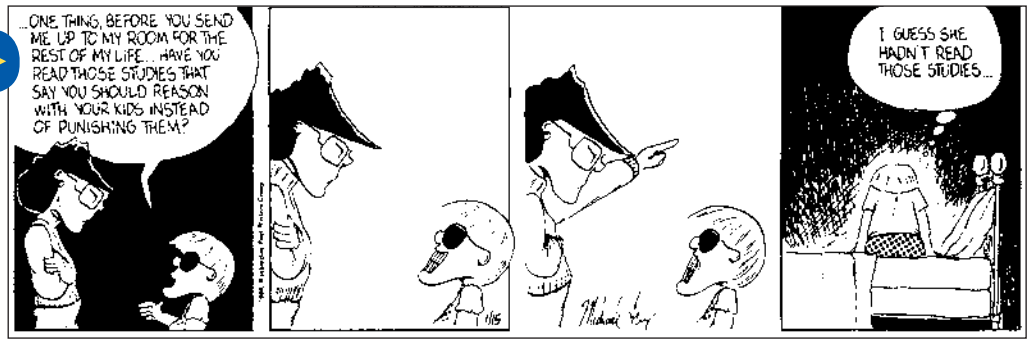
Figure 11.9
Parenting Styles

These three parenting styles differ greatly in the areas of warmth toward children, discipline, communication, and expectations. What kind of parent would you like to be?

Which Style?

Is this parent more likely to be authoritative or authoritarian?

CHEEVERWOOD


...ONE THING, BEFORE YOU SEND ME UP TO MY ROOM FOR THE REST OF MY LIFE... HAVE YOU READ THOSE STUDIES THAT SAY YOU SHOULD REASON WITH YOUR KIDS INSTEAD OF PUNISHING THEM?
I GUESS SHE HADN'T READ THOSE STUDIES...

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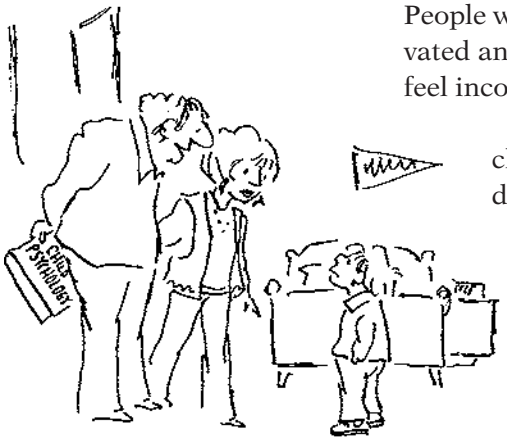
authoritarian parenting A style of parenting marked by imposing rules and expecting obedience.

permissive parenting A style of parenting marked by submitting to children's desires, making few demands, and using little punishment.

authoritative parenting A style of parenting marked by making demands on the child, being responsive, setting and enforcing rules, and discussing the reasons behind the rules.

- **Authoritarian parenting** is a style of parenting marked by imposing rules and expecting obedience. These parents are low in warmth, and their version of discipline is strict and often physical. Communication is high from parent to child but low from child to parent. Maturity expectations are high.
- **Permissive parenting** is a style of parenting marked by submitting to children's desires and using little punishment. These parents are high in warmth, but they rarely discipline their children. Communication is low from parent to child but high from child to parent. Expectations of maturity are low.
- **Authoritative parenting** is a style of parenting marked by making demands on the child, being responsive, setting and enforcing rules, and discussing the reasons behind the rules. These parents are high in warmth, and their version of discipline is moderate. Communication is high from parent to child *and* from child to parent. Maturity expectations are moderate.

Does one form of parenting have a clear advantage over the other two? According to Baumrind and others, authoritative parents often produce children high in self-esteem, self-reliance, and social competence (Buri et al., 1988). These children are usually more successful, happy, and generous with others. What accounts for these findings? One factor may be that authoritative parents allow their children to develop a *sense of control* over their lives. People who believe they have some control over their destiny tend to be motivated and self-confident. Those without a sense of control are more likely to feel incompetent and helpless (Rohner, 1994).



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Don't you realize, Jason, that when you throw furniture out the window and tie your sister to a tree, you make Mommy and Daddy very sad?

Parenting style is not, however, a one-size-fits-all proposition. Bolder children often need more restrictive parenting, whereas fearful children often respond better to gentler parenting (Bates et al., 1998; Kochanska & Thompson, 1997). Cultural differences and expectations also influence parenting style (Wachs, 1999). For example, parents in cultures that emphasize respect for elders are more likely to use the authoritarian parenting style.

Parenting is a challenging, full-time job. Anyone can make a baby, but it takes a lot of character to make a good parent. Few gifts are more important than parents' investment of time, love, and warm responsiveness to their children. I am more likely to regret the time not spent with my children than the time spent

with them. Perhaps Jacqueline Kennedy Onassis summed it up best when she said, "If you bungle raising your children, I don't think whatever else you do matters very much" (quoted in Lewis, 2002).

PAUSE NOW OR MOVE ON

Turn to page 211 to review and apply what you've learned.

Three Key Developmental Issues

WHAT'S THE POINT?

11-5 What are the three major issues developmental psychologists debate regarding infant and child development?

We have looked at some of the important research on physical, cognitive, and social-emotional development during infancy and childhood. We can view this research on development in terms of three important issues: continuity and stages, stability and change, and nature and nurture. Here are some research results related to these issues in infancy and childhood.

Continuity and Stages

How is our development continuous, and how do we develop in stages? In some areas, such as attachment, development is a continuous process. Cognitive development is also more continuous than stagelike. But in other areas—such as motor development, where milestones are more easily viewed—we clearly pass through stages.

Stability and Change

What remains stable across our development, and how do we change? Clearly, we change physically, cognitively, and socially as we grow up. On the other end of the spectrum, temperament is relatively stable throughout the life span. Fortunately, change is possible for infants from neglectful backgrounds who move into more nurturing homes, if the move takes place early enough in the child's life.

Nature and Nurture

How does the interaction of nature and nurture affect development? The interaction of both heredity (nature) and environment (nurture) shapes a child's development. In the area of physical development, for example,

environmental factors combine with a child's genetic tendencies to shape the fetus until the moment of birth. Two outcomes stemming from this interaction are evident: the relative health of a child whose mother avoided alcohol and nicotine during pregnancy and the illnesses of children with FAS. In the area of cognitive development, children learn new behaviors based not only on developmental readiness but also on whether they are raised in a stimulating or a nonstimulating environment. And in the area of social development, children's interactions are influenced by both their inborn temperaments and the supportive or neglectful environments in which they are raised.

PAUSE NOW OR MOVE ON

Turn to page 212 to review and apply what you've learned.

We have evidence for both continuity and stages in a child's growth. Children's lives have both stability and the capacity for change. And both nature and nurture make us who we are.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 11

Thinking About Prenatal and Childhood Development

The Beginnings of Life

WHAT'S THE POINT?

11-1 How do humans grow from single cells into newborns?

- The prenatal stage of development starts at conception and ends at birth.
- Fertilized eggs, called zygotes, divide rapidly, implant in the uterine wall, and at 14 days are called an embryo.
- At 9 weeks, the organism is called a fetus and is human in form.
- The fetus receives nutrients through the placenta, which shields it from most harmful substances (except teratogens).
- Newborns have behavioral reflexes that help them survive.

Apply What You Know

1. A label on a medication says, "Should not be taken by pregnant women." This warning indicates that the medication could be a _____.
2. Temperament research shows that a person who is social, has a quick temper, and loves to take risks probably

   a. was an "intense" baby and child.
   b. did not respond to the rooting reflex.
   c. had an excess of genes as a newborn.
   d. was exposed to dangerous teratogen levels.

Physical Development in Infancy and Childhood

WHAT'S THE POINT?

11-2 How do genes and early experiences affect infant and child development?

- Physical development occurs quickly during the infancy and childhood stages.
- At birth, the brain has not yet formed the neural networks that control complex behaviors (such as motor skills) and cognitions (such as memory).
- Motor skills develop with the neural network, guided by our genetic blueprint.
- Early experiences affect cognitive development, such as reading skills.

Apply What You Know

3. Which statement is accurate about the relationship between brain development and memory?
   a. Events occurring during infancy usually aren't remembered because of a lack of neural connections.
   b. The brain develops most of its brain cells after birth, so memories of infancy are rare.
   c. Brain development is finished at birth and does not have a dramatic effect on memory.
   d. Some remember infancy because they were born with more brain neurons than others.
4. Which of the following kinds of development will be affected *least* by early life experiences?
   a. motor development
   b. attachment development
   c. cognitive development
   d. social development

Cognitive Development in Infancy and Childhood

WHAT'S THE POINT?

11-3 How does Jean Piaget's theory of cognitive development describe how children think at specific cognitive stages?

- Piaget's theory includes four stages of cognitive development: sensorimotor (learning through sensory impressions and motor activities), preoperational (learning to use language but not yet able to think logically), concrete operational (gaining the schemas required for logical analysis of concrete events), and formal operational (thinking logically about abstract concepts and strategizing).
- Piaget's stages accurately describe the order of cognitive development, although he underestimated children's cognitive abilities in each stage. Cognitive development also is more continuous than Piaget thought.

Apply What You Know

5. A child develops the idea that all teachers are female because the child encounters only female teachers. This idea is an example of
   a. a schema.
   b. a formal operation.
   c. preoperational thinking.
   d. conservation.
6. True or False: A 6-year-old who can't seem to understand anything other than her point of view is probably going through the formal operational stage.

Social Development in Infancy and Childhood

WHAT'S THE POINT?

11-4 What are the probable effects of attachment types and parenting styles?

- Social development occurs in predictable patterns during infancy and childhood. For example, most children go through a period of stranger anxiety.
- Body contact, familiarity, and responsiveness influence attachment to parents, which in turn influences later characteristics such as social competence, ability to form other attachment, and effect of attachment disruption.
- Research indicates that parenting styles influence self-esteem, self-reliance, and social competence. Of the three parenting styles identified in the research (authoritarian, permissive, and authoritative), authoritative seems to be the most advantageous.

Apply What You Know

7. Parents who want to increase the likelihood of their children developing secure attachments to them should pay most attention to

a. their own responsiveness.
b. the concrete operational stage.
c. imprinting shortly after birth.
d. sensorimotor stage schemas about temperament.

8. Which of the following best describes the most advantageous parenting style according to Diana Baumrind's research?

a. Parents require children to follow rules but explain and discuss the rules as a family.
b. Parents set rules and make sure children follow the rules without questioning or discussion.
c. Parents encourage children to learn the rules themselves and don't set "family rules" or enforce them.
d. Parents let the children set and enforce the rules of the family and work to be friends with their children.

Three Key Developmental Issues

WHAT'S THE POINT?

11-5 What are the three major issues developmental psychologists debate regarding infant and child development?

- Developmental psychology research can be analyzed in terms of three issues: continuity and stages, stability and change, and nature and nurture.
- Some elements, such as attachment and cognitive development, develop in a more continuous process. But other factors, such as motor development, develop in more discrete stages.
- Many factors change as we develop and grow older, but some (like temperament) remain relatively unchanged as we age.
- The interaction of both heredity (nature) and environment (nurture) shapes development.

Apply What You Know

9. Which key developmental psychology issue is most relevant to criticism of Piaget's cognitive development theory?

a. continuity and stages
b. stability and change
c. nature and nurture
d. assimilation and accommodation

10. Which key developmental psychology issue best addresses the question "Does basic personality develop over time, or do people keep the personality they had as children?"

KEY TERMS AND KEY PEOPLE

zygote, p. 192
genes, p. 192
embryo, p. 192
fetus, p. 193
teratogens, p. 193
fetal alcohol syndrome (FAS), p. 194
rooting reflex, p. 194
temperament, p. 195
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developmental psychology, p. 198
cognition, p. 198
schemas, p. 198
assimilation, p. 198
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sensorimotor stage, p. 200
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concrete operational stage, p. 202
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stranger anxiety, p. 204
attachment, p. 205
critical period, p. 206
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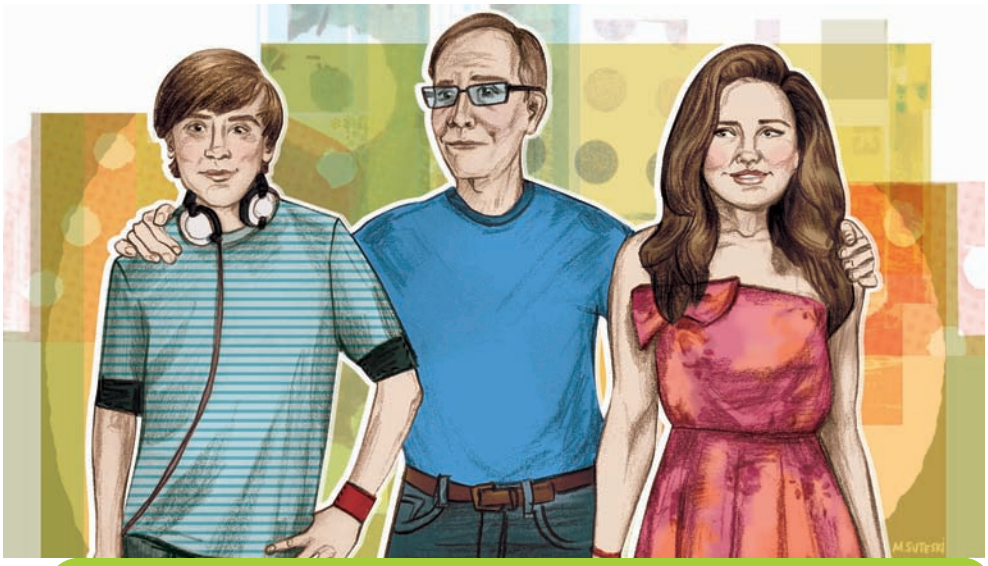
authoritarian parenting, p. 208
permissive parenting, p. 208
authoritative parenting, p. 208
Jean Piaget [pee-ah-ZHAY] (1896–1980), p. 198
Konrad Lorenz (1903–1989), p. 206

MODULE 12

Adolescence



It's sometimes frustrating to be an adolescent; you're too old to act like a little kid, but you haven't yet reached full adult status. Despite the frustrations, it's a stage of life packed with significant changes. Better than that, it's *your* stage of life!

What Is Adolescence?

Physical Development in Adolescence

Cognitive Development in Adolescence

- Reasoning
- Morality

Social Development in Adolescence

- Developing Identity
- Developing Intimacy
- Independence from Family

Three Key Developmental Issues

- Continuity and Stages
- Stability and Change
- Nature and Nurture

Just for a minute, think of yourself in the fourth grade. Think of your physical self, the things you liked to do, the sorts of thoughts that occupied your mental life, the activities you engaged in, and the friends you had. How have you changed between then and now? Just the thought might leave you chuckling, glad that you've left your former self behind. The changes that occur during adolescence are probably the most dramatic changes you'll ever go through, with the possible exception of the rapid changes that occurred very early in your life.

In a sense, everything about an introductory psychology course relates to you. Pick any module and you will find relevant material that helps you understand yourself and your world better. Yet no module is more relevant to you than this one. Adolescence is where you're at! The physical, cognitive, and social aspects we discuss in this module are psychology's best and most current efforts to explain this time of your life.

adolescence The transition period from childhood to adulthood, extending from puberty to independence.

What Is Adolescence?

WHAT'S THE POINT?

12-1 What is adolescence, and how does our culture affect it?

Imagine living in a hunting and gathering society that celebrated your thirteenth birthday with a ceremony proclaiming you an adult. Shortly thereafter, you would marry, start your family, and settle into your adult life-style. Your occupational choices would be quite limited. If you're female, you would likely devote yourself to child-rearing and domestic tasks. If you're male, your occupation might well be hunting. Societies like this still exist in some parts of the world. Had you been born into one, your adolescent experience would be brief and vastly different from what you are most likely experiencing now as an American teen. Even in the more rural America of the 1800s, your transition from childhood to adult life would have happened more quickly. At that time, formal education for many young people ended with eighth grade, and young couples married, began farming, and started a family before they turned 20. Now, however, adolescence is becoming increasingly long and complex. **Adolescence** is the transition period from childhood to adulthood; it extends from puberty to independence.

Adolescence begins with sexual maturation, which is happening about two years earlier than it did a hundred years ago (see **Figure 12.1**). Adolescence is being prolonged on the other end, too. As more and more students continue their formal education to college and beyond, independent adult status is delayed longer and longer. Young Americans are also waiting longer to marry and start families. Children may depend at least partially on their parents for financial support well into their twenties and sometimes longer.

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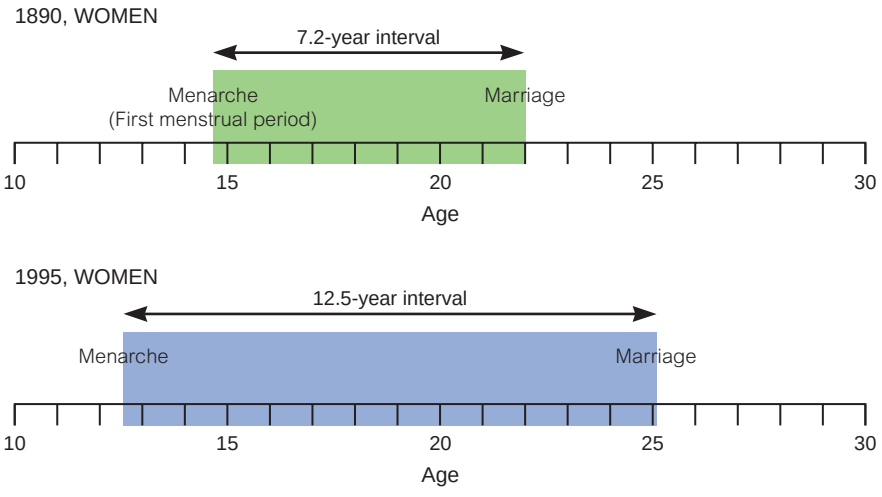

Figure 12.1
Adolescence Is Taking Longer

Puberty is happening earlier, and marriage, financial independence, and the end of formal education are happening later. These events are stretching adolescence on both ends. (From Guttmacher Institute, 2000.)

JEFF GREENBERG

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KIRK STRICKLAND/ISTOCKPHOTO

Adolescent Scenes

Are these activities that you enjoy? Can you identify other typical American adolescent activities?

The fact that most teenagers reach physical maturity long before they are able to assume adult roles can—and does—create some tension and frustration, which you have most likely experienced. One day you may be eager to sample a more adult activity (say, a road trip to another town to visit friends), only to have your parents deny permission because they feel you're not quite ready for that much independence. Next thing you know, your harmless but exuberant roughhousing with a sibling or friend is interrupted with a parental admonishment to "grow up and act your age." When you want to be an adult, the message is often to be patient and wait. When you want to act like a child, you hear that it's important to be responsible and mature.

This is not to imply that adolescence must be a time of stormy rebellion and confusion. Teenagers display tremendous accomplishments—excelling in school, on the job, as volunteers, at sports, and in other creative endeavors. The transition from child to adult is jarring for some families, who struggle mightily with issues surrounding the amount of independence and responsibility teenagers should have. But others seem to navigate these waters with a minimum of disturbance and disruption. And for most families, the gradual growth in maturity and responsibility on the part of the teen is matched by a growing confidence on the part of the parents.

For most teenagers, the experience of adolescence is an exciting opportunity to explore the possibilities of adult life. In fact, four out of five teenagers agree with the statement "I would choose my life the way it is right now" (Lyons, 2004).

PAUSE NOW OR MOVE ON

Turn to page 228 to review and apply what you've learned.

puberty The period of sexual maturation, during which a person becomes capable of reproducing.

primary sex characteristics The reproductive organs—ovaries, testes, and external genitalia.

secondary sex characteristics Nonreproductive sexual characteristics, such as breast and hip development in females and voice quality and facial hair in males.

Physical Development in Adolescence

WHAT'S THE POINT?

12-2 What major physical changes occur during adolescence?

The most important physical development of adolescence is **puberty,** the period of sexual maturation during which a person becomes capable of reproducing. A flood of hormones, which lead to physical and emotional changes, triggers this amazing time of change. Puberty generally begins earlier in girls (about 11 years of age) than it does in boys (around 13 years). Although puberty begins years later in some individuals than in others, it generally starts earlier now than it used to (Herman-Giddens et al., 2001). One of the most obvious changes is a growth spurt. Sixth- or seventh-grade girls often tower over their male classmates, but soon the boys catch up and outgrow the average female (see Figure 12.2).

During the growth spurt, both primary and secondary sex characteristics develop (see Figure 12.3). The **primary sex characteristics** are the reproductive organs—the *testes* in males and the *ovaries* in females. The **secondary sex characteristics** are nonreproductive sexual characteristics, such as breast and hip development in girls and voice quality and facial hair in boys.

Two of the more obvious events of puberty are the beginning of menstruation (known as *menarche*) for females and the beginning of ejaculation for boys (which often happens during sleep as a *nocturnal emission*). Each is a memorable event that produces a variety of emotions in the young woman or young man. Teens who have been prepared to expect these events are more likely to view them as positive, rather than frightening or negative, experiences (Fuller & Downs, 1990; Greif & Ulman, 1982; Woods et al., 1983).

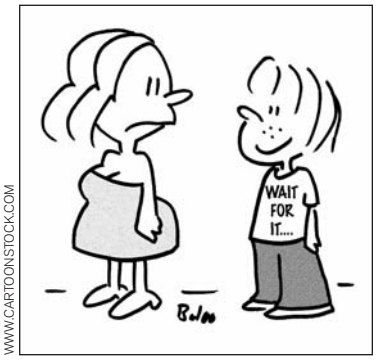

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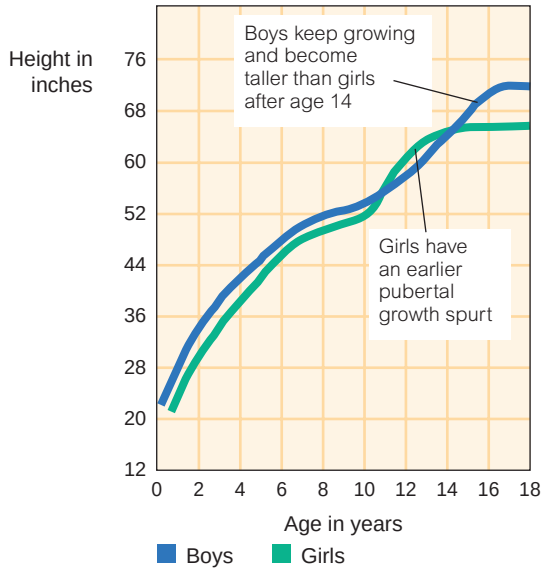
Figure 12.2
The Growth Spurt

Girls start the growth spurt earlier, but once boys catch up around age 14, they tend to grow taller than girls. (From Tanner, 1978.)



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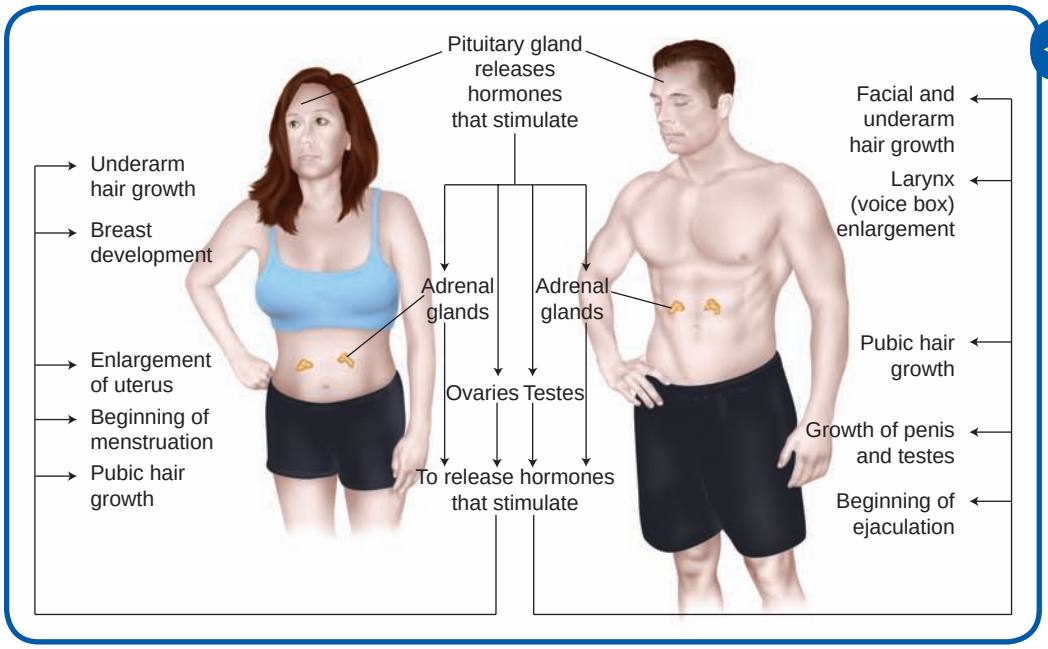

Figure 12.3
The Wonder of Puberty

The release of hormones during puberty triggers amazing changes in the body. Some of those changes are illustrated here.

Sexuality is certainly a *biological* event, but *cognitive* and *cultural* factors also govern sexual behaviors. Our culture is saturated with sexual imagery. A typical hour of prime-time network television contains about 15 sexual references, most of which ignore the risks of unwanted pregnancy and sexually transmitted diseases (Brown et al., 2002; Kunkel, 2001; Sapolsky & Tabarlet, 1991). Add to this the sexual content of popular music, movies, print media, and the Internet, mix in the increased sex drive triggered by the hormones released during puberty, and you have a recipe for the dramatic increase in teen sexual activity in the United States over the course of the last century (Smith, 1998). Teens receive a decidedly mixed message calling not only for abstinence but also for "safe" sex, protected by condom use. Rarely discussed are the tremendous emotional risks of committing oneself sexually to another person. Is it any wonder that making decisions is sometimes so difficult, especially when teens are still working to complete their development of decision-making skills (as we will see in the next section)?

Another source of conflict, anxiety, and misunderstanding is **sexual orientation,** one's attraction toward people of a particular gender. Heterosexuals (or "straights") are attracted to members of the opposite sex, whereas homosexuals (gay men and lesbian women) are attracted to members of the same sex. A number of scientific studies indicate that 3 to 4 percent of men and 1 to 2 percent of women are exclusively homosexual (Laumann et al., 1994; Mosher et al., 2005; Smith, 1998). Most of the remaining men and women are exclusively heterosexual, with perhaps 1 percent bisexual (attracted to members of both sexes).

We do not know precisely what determines sexual orientation, but research suggests that some possibilities are unlikely. Studies have *not* been able to establish that homosexuality is related to parenting styles, a person's hatred or fear of the opposite sex, or a childhood history of being raised by or exploited by homosexual adults (Bailey et al., 1995; Golombok & Tasker, 1996; Storms, 1983). There have been studies that suggest a variety of biological factors may impact sexual orientation. For example, several hundred animal species exhibit

sexual orientation Enduring sexual attraction toward people of the other gender (heterosexuality) or one's own gender (homosexuality).

some same-sex behavior (Bagemihl, 1999), and researchers have changed the sexual orientation of rats by manipulating the mother's hormones during pregnancy (Dorner, 1976, 1988). In humans, a difference has been found between the brains of heterosexuals and those of homosexuals (LeVay, 1991).

A final aspect of physical development in adolescence relates to continued maturation of the brain, a process that begins before birth. After puberty, unused connections among nerve cells in the brain disappear (Blakemore, 2008). The frontal lobes of the brain—responsible for planning, judgment, and controlling impulses—are the last to complete this development, a process that isn't fully completed until about 25 years of age (Beckman, 2004).

PAUSE NOW OR MOVE ON

Turn to page 228 to review and apply what you've learned.

Cognitive Development in Adolescence

WHAT'S THE POINT?

12-3 How does adolescent reasoning differ from that of younger children?

Reasoning

As we move through our childhood, we progress through a sequence of increasingly sophisticated cognitive abilities. By the time adolescence begins, we are approaching what developmental psychologist **Jean Piaget** (pronounced pee-ah-ZHAY) called the *formal operational stage,* when we may develop adult thinking and reasoning. Formal logic, abstract thinking, and hypothetical reasoning are now possible, and these changes represent *qualitative* growth in cognitive skills. Adolescents with these skills don't just think more, they think differently. Trying to teach a typical 6-year-old high school algebra would be futile because children at this age simply can't "get it." Introducing these courses in the secondary curriculum is a different story. By adolescence, most young people will have the mental tools to take on these abstract concepts.

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JEAN PIAGET [pee-ah-ZHAY] (1896–1980) Pioneer in the study of developmental psychology who introduced a stage theory of cognitive development that led to a better understanding of children's thought processes.

Of course, adolescents don't think with perfect clarity and logic all the time. According to David Elkind (1978), this is an age when one tends to focus on the self, often imagining that one's own feelings are particularly unique. Falling in love for the first time may lead to the feeling that this experience is unlike anything anyone else has ever felt. And a first breakup can be so intense that it is nearly impossible to believe that others (even parents!) have had similar experiences.

This focus on the self makes some adolescents prone to impulsive behavior and risk taking (for example, think of the time you spent several hours on

a video game instead of finishing a required school project, or the teens who start smoking). As we learned in the previous section, this may be partly biological, too. The brain's frontal lobes, largely responsible for long-term planning and impulse control, aren't fully mature until the mid-twenties.

Despite this focus on self, people of your age are fully capable of idealistic thinking and can quickly recognize and condemn the hypocrisy you now so easily detect in the world around you. You and your age mates tend to work hard for causes in which you believe. Your newfound formal operational skills may also lead you to examine your own and others' religious beliefs on a much deeper level than your childhood understandings allowed (Elkind, 1970; Worthington, 1989).

AP PHOTO/REED SAXON

Growing Cognitive Capabilities

Teenagers are often eager to exercise the reasoning skills that mark their entry into Jean Piaget's formal operational stage. For some, this takes the form of involvement in society's important ethical debates.

Morality

One special aspect of cognitive development is morality—a sense of right and wrong. Psychologist **Lawrence Kohlberg's** (1981, 1984) theory of moral reasoning demonstrates how our way of thinking about moral situations changes with our level of development. In his research, Kohlberg posed moral dilemmas to his research participants. Here is one such dilemma Kohlberg used:

> In Europe, a woman was near death from a very bad disease, a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging 10 times what the drug cost him to make. He paid $200 for the radium and charged $2000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could get together only about $1000, which was half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug and I'm going to make money from it." Heinz got desperate and broke into the man's store to steal the drug for his wife.

LEE LOCKWOOD/TIME & LIFE PICTURES/GETTY IMAGES

LAWRENCE KOHLBERG (1927–1987) Created a three-stage theory of moral development.

This story has a dated feel to it now, but it continues to draw out people's thought processes, which was Kohlberg's intent. He was not interested so much in whether a person thought Heinz was right or wrong. Rather, he wanted to record the moral *reasoning* individuals used to make their decisions about this and other scenarios. From the answers he received, he developed a theory that organized moral development into three levels in which the focus shifts from concern with self (preconventional), to concern with fitting in (conventional), to concern with broader ethical principles

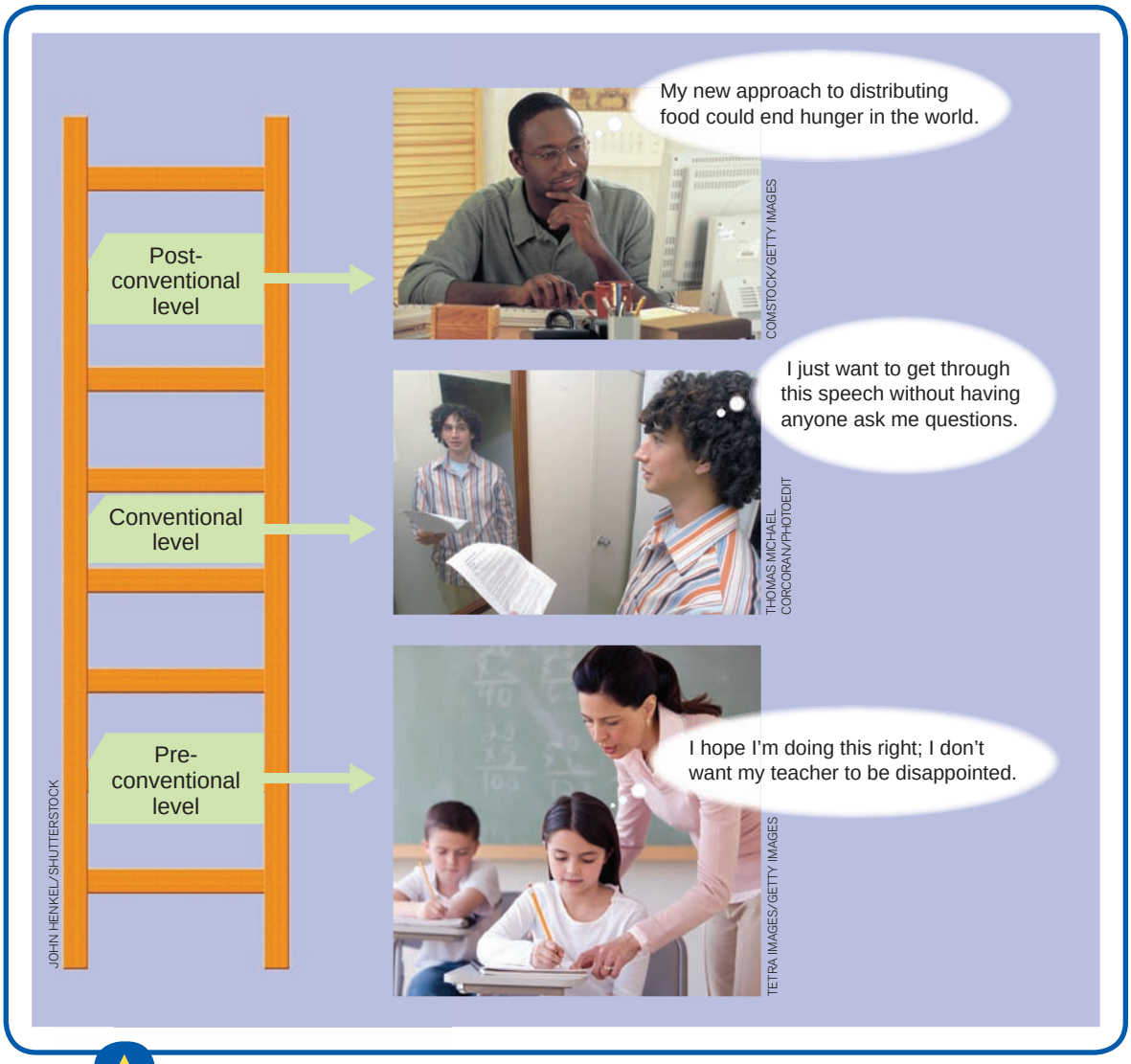
Post-conventional level
Conventional level
Pre-conventional level
My new approach to distributing food could end hunger in the world.
I just want to get through this speech without having anyone ask me questions.
I hope I'm doing this right; I don't want my teacher to be disappointed.
JOHN HENKEL/SHUTTERSTOCK
COMSTOCK/GETTY IMAGES
THOMAS MICHAEL CORCORAN/PHOTOEDIT
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Figure 12.4
Climbing Lawrence Kohlberg's Ladder of Moral Development

As moral reasoning progresses, the focus changes from concern with self (preconventional), to concern with fitting in (conventional), to concern with broader ethical principles (postconventional).

(postconventional). We can think of these levels as three rungs on a moral ladder (see **Figure 12.4**):

1. *Preconventional moral reasoning*—This primitive level of moral reasoning is characterized by a desire to avoid punishment or gain reward. Most children under the age of 9 show this type of moral reasoning, and some adults never progress beyond this level. Examples of statements that indicate preconventional reasoning include "Heinz was wrong to steal the drug because he might be put in jail" or "Heinz was right to steal the drug because he would then have the companionship of his wife longer."
2. *Conventional moral reasoning*—The primary concern of conventional moral reasoning is to fit in and play the role of a good citizen. People at this level have a strong desire to follow the rules and laws of society. Conventional moral reasoning is typical of most adults, according to Kohlberg. It is generally apparent by early adolescence, when Piaget's formal operational thought kicks in. Examples of statements indicating conventional moral reasoning include "Heinz was wrong to steal because stealing breaks the law" or "Heinz was right to take the drug because most people would do what they must to protect a family member."

3. *Postconventional moral reasoning*—Most people do not reach this third level. Postconventional moral reasoning is characterized by references to universal ethical principles that represent the rights or obligations of all people. Individuals at the postconventional level might say, "Heinz was justified because everyone has a right to live, and he was simply trying to help his wife stay alive," or, "Heinz was wrong because everyone must respect the property of others, even the property of a selfish and greedy druggist."

Has Kohlberg's theory of moral reasoning survived the test of time and the scrutiny of other researchers? As is often the case, some evidence supports his theory while some doesn't fit quite so well. Follow-up studies support the idea of a progression from preconventional to conventional thought in childhood (Gibbs et al., 2007). The postconventional stage is not strongly supported. The evidence indicates that this stage is largely a product of the white male population Kohlberg sampled (Eckensberger, 1994; Miller & Bersoff, 1995). This sample came mostly from groups that value *individualism*. In North America and Western European countries, for example, individual goals tend to take precedence over group objectives (children are taught to "stand on your own two feet" and "think for yourself"). And in these countries, there is evidence of a progression to postconventional thinking. But in more *communal* cultures, with a greater emphasis on shared group goals (children are taught to put the needs of the family and community ahead of the self), the notion that postconventional morality is superior to conventional morality receives less support. Similarly, North American women, who tend to be more communal than their male counterparts, also show less of Kohlberg's postconventional reasoning.

Kohlberg emphasized moral reasoning, but Jonathan Haidt (2002, 2007, 2008) believes that *feelings* are more important than reasons. Haidt argues that we make up our mind in moral situations based on what our gut tells us and then use reasoning to defend our gut reactions. Whether our moral choices are based more on reasoning or more on our gut, they are important choices in our lives. Ten years from now, how do you think you will feel about the moral choices you are making now as a teenager?

PAUSE NOW OR MOVE ON

Turn to page 229 to review and apply what you've learned.

Social Development in Adolescence

WHAT'S THE POINT?

12-4 What behaviors support Erikson's idea that developing a sense of identity is the primary challenge of adolescence?

To be human is to be social. Even the shyest among us experiences some social interaction as a part of normal development. Social interaction lies at the heart of all communication, from daily negotiations between siblings to

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ERIK ERIKSON (1902–1994) Created an eight-stage theory of social development.

the gestures exchanged by drivers squabbling over who has the right of way at an intersection. Your friendships and romances, decisions about conformity and nonconformity, and concerns about popularity and separation from family all relate to social development.

Erik Erikson's (1963) theory of social development illustrates how certain issues peak during different periods of life, including adolescence. He divided the life span into eight stages, ranging from infancy to late adulthood (see **Table 12.1**). Each stage has its own psychosocial developmental task. This task is a challenge, and the way the individual handles the task will lead to a more desirable or less desirable outcome. For example, in healthy situations, infants will develop more trust than mistrust, toddlers will develop more autonomy than shame or doubt, and preschoolers will show more initiative than guilt about their attempts to be independent. Let's take a closer look at what Erikson had to say about adolescence and young adulthood, the two stages you are closest to.

ROBIN RUSSELL

Initiative vs. guilt

MYRLEEN FERGUSON CATE/PHOTO EDIT

Industry vs. inferiority

RON LEVINE/GETTY IMAGES

Identity vs. role confusion

Table 12.1

Erikson's Stages of Psychosocial Development

Stage (Approximate Age)	Issues	Description of Task
Infancy (0 to 1 year)	*Trust vs. mistrust*	If needs are dependably met, infants develop a sense of basic trust.
Toddlerhood (1 to 3 years)	*Autonomy vs. shame and doubt*	Toddlers learn to exercise their will and do things for themselves, or they doubt their abilities.
Preschooler (3 to 6 years)	*Initiative vs. guilt*	Preschoolers learn to initiate tasks and carry out plans, or they feel guilty about efforts to be independent.
Elementary school (6 years to puberty)	*Industry vs. inferiority*	Children learn the pleasure of applying themselves to tasks, or they feel inferior.
Adolescence (teen years into 20s)	*Identity vs. role confusion*	Teenagers work at refining a sense of self by testing roles and then integrating them to form a single identity, or they become confused about who they are.
Young adulthood (20s to early 40s)	*Intimacy vs. isolation*	Young adults struggle to form close relationships and to gain the capacity for intimate love, or they feel socially isolated.
Middle adulthood (40s to 60s)	*Generativity vs. stagnation*	Middle-aged people discover a sense of contributing to the world, usually through family and work, or they may feel a lack of purpose.
Late adulthood (late 60s and older)	*Integrity vs. despair*	When reflecting on his or her life, the older adult may feel a sense of satisfaction or failure.

Developing Identity

identity One's sense of self; according to Erikson, the adolescent's task is to solidify a sense of self by testing and integrating various roles.

During adolescence and into the early twenties, your primary task is to develop an **identity,** a strong, consistent sense of who and what you are. According to Erikson, the adolescent's task is to solidify this sense of self by testing and integrating various roles. As you try on different ways of thinking and behaving (What do I value in life? What are my priorities? Why did I act that way?), your goal is to generate an ever-stronger sense of self.

The search for identity during adolescence has several characteristics:

- *Experimentation*—Adolescents often experiment in healthy ways: exploring and taking advantage of a variety of school opportunities, observing various adult role models, or imagining life in a variety of careers. (What would it be like to be a physician? An artist? What about a schoolteacher, a nurse, or a firefighter?) But as adolescents sort out what is appealing and what isn't, the experimentation can be less healthy and productive, such as involvement with drugs or promiscuous sexual behavior.

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"Mom, you were young once . . . right?"

- *Rebellion*—Healthy development includes building some independence. Most parents have an image of what their children should become, and most children maintain the same core values as their parents. Nevertheless, the search for identity during adolescence may involve testing the limits parents set or adopting styles of fashion and grooming that adults may not accept or understand. But the drive for independence becomes unhealthy when rebelling against society's standards takes the form of criminal or self-destructive behavior. Healthy adolescents exercise their independence in ways that do not harm themselves or others.
- *"Self"-ishness*—Relationships during adolescence tend to be "self"-ish. Teens increasingly learn about their unique self as they move in and out of friendship cliques and romances. Each new relationship is a chance to try different ways of interacting. Teen friendships are genuine and important, but they tend to be temporary. Some people do maintain lifelong friendships with high school friends, but most young adults find that these friendships become fond memories as they settle into career and family patterns a few years later. Of course, if you'd told me this when I was a teenager, I would have said you were nuts! My friends were the center of my life in high school. But as I finished my education and moved on to my career, most of these friendships gradually and naturally gave way to others that have lasted longer. It will be interesting to see if social networking sites like Facebook, or cell phones with text plans and no additional charge for long distance calls, will make it easier to maintain high school relationships for your generation than it was for mine.
- *Optimism and energy*—Most teenagers, armed with their new and more powerful cognitive skills, view the world with a fresh (and refreshing) perspective. They have trouble understanding why some children go to bed hungry and why adults tolerate pollution, discrimination, racism,

or a thousand other injustices. Many adolescents are willing to tackle serious issues related to human rights, environmental concerns, political campaigns, and other causes. This willingness to contribute time and effort not only helps make the world a better place but also helps teens develop a strong sense of their own priorities. (For more on the benefits of optimism, see Thinking About Positive Psychology: Adolescence, Optimism, and Positive Psychology.)

Some adolescents realize a strong sense of identity with little or no struggle. A few may remain confused throughout their lives. Meeting the psychosocial challenge is especially difficult for those individuals who have struggled with the developmental tasks of previous stages. As you might imagine, achieving a sense of who you are is a lot easier if you're already trusting, autonomous, full of initiative, and industrious. Erikson felt that adolescents who had not achieved the developmental goals of their younger years could experience profound confusion about their place in the world. But even if developmental goals do not come easily, they are always within reach. Most of us hit some rough patches before the pieces settle into place in the late teens or twenties.

Thinking About POSITIVE PSYCHOLOGY

Adolescence, Optimism, and Positive Psychology

Erik Erikson teaches us that optimism is an important characteristic of adolescent identity. But how do you measure optimism? And does optimism really provide benefits?

According to research done by positive psychologists, optimism truly is an important ingredient for happy, productive lives. Before we take a look at some of the benefits of optimism, answer this brief survey to see how you measure up on optimism.

Life Orientation Test: How Optimistic Are You?

Respond to each statement using the following scale:
0—strongly disagree; 1—disagree; 2—neutral; 3—agree; 4—strongly agree

1. In uncertain times, I usually expect the best.
2. If something can go wrong for me, it will.
3. I'm always optimistic about my future.
4. I hardly ever expect things to go my way.
5. I rarely count on good things happening to me.
6. Overall, I expect more good things to happen to me than bad.

To score yourself, first reverse the numbers you placed in answer to statements 2, 4, and 5. That is, for each of these items, change 0 to 4, 1 to 3, 3 to 1, and 4 to 0 (a 2 remains a 2). Leave the numbers in front of the rest of the statements unchanged. Then add up the numbers in front of all items to obtain a final score. Scores range from 0 to 24, with higher scores reflecting greater optimism. The average (mean) score is between 14 and 15.

Source: Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67,* 1063–1078.

If you scored 15 or above on the test, you are above average in optimism. Among college students, those who are more optimistic are less likely to experience loneliness, stress, and depression (Aspinwall & Taylor, 1992). They are also less likely to experience physical illness (Scheier & Carver, 1985). These psychological and physical benefits seem to persist throughout the life span. In fact, optimistic people live an average of 7.5 years longer than those who are less optimistic (Levy et al., 2002).

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Who Am I?

As adolescents search for a strong sense of identity, they may experiment with a variety of different looks.

Developing Intimacy

According to Erikson, young adults strive to achieve **intimacy**—the ability to form close, loving, and open relationships with other people. Many people have their most intense, intimate relationship with a spouse, but not all marriages achieve this type of closeness. Intimacy is not necessarily sexual by nature, and it often occurs outside marriage with close, trusted friends and family members.

As noted earlier, Erikson realized that "baggage" from previous developmental stages would accumulate as we move from one stage to the next and that this baggage would affect our ability to negotiate current developmental challenges. Young adults facing the challenge of intimacy versus isolation cannot share themselves honestly and openly if they are still confused about their own sense of self.

intimacy In Erikson's theory, the ability to form close, loving, open relationships; a primary task in early adulthood.

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Intimacy

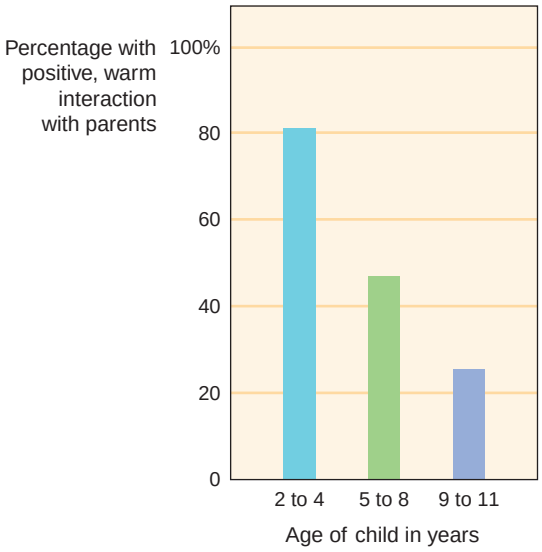
Young adults strive to develop intimate relationships based on open, honest communication.

Independence From Family

In Western cultures, separating from family to become more independent begins in childhood but picks up speed in adolescence (Shanahan et al., 2007). Children move from a primary attachment to their parents to a primary

Figure 12.5
Changes in Parent-Child Relationships Over Time

A large survey of Canadian families shows that there is less warmth, and presumably more distance, in parent-child interactions as children grow older. (From Statistics Canada, 1999.)

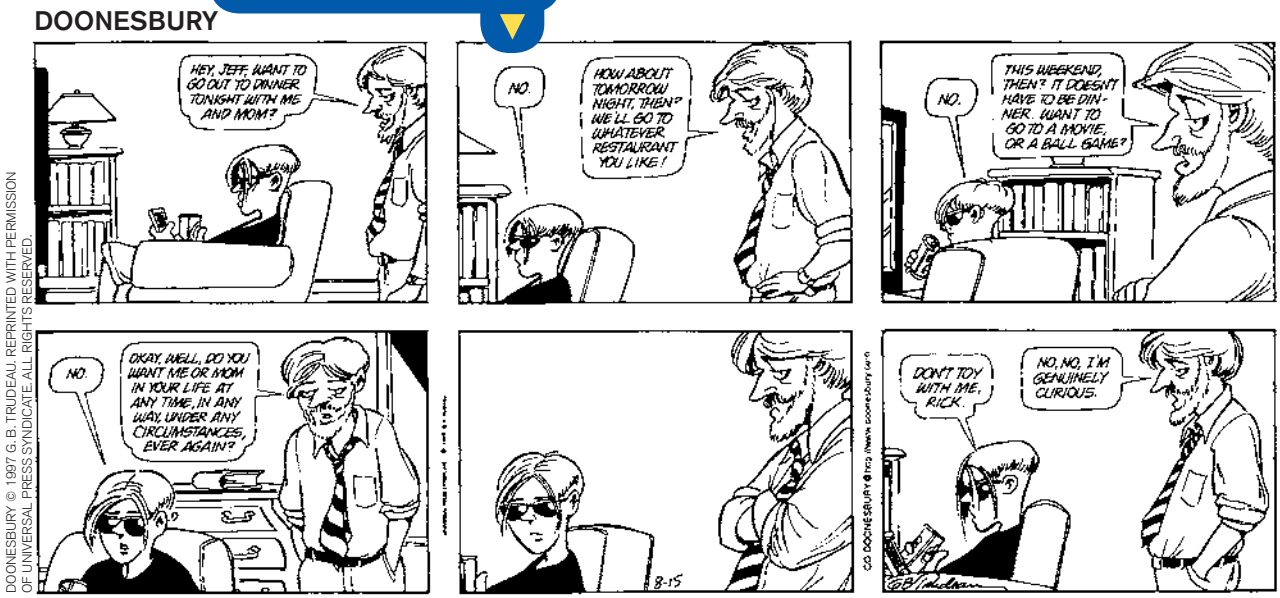


attachment to their peers. You can observe this in any mall if you watch parents interacting with their preschool-age children and then watch parents interacting with their teenage children. Your first observation will probably be that not as many teenagers go to the mall with their parents! In fact, teens mostly hang out with other teens, and their relationships may be cliquish (Aronson, 2001). Because of this teenage tendency for cliques, some teenagers will feel excluded; these teenagers are prone to depression and loneliness, and a few of them may even lash out violently (Steinberg & Morris, 2001).

When parents and adolescents are together, they will probably display less warmth and emotional closeness than you'll see in families with younger children. **Figure 12.5** shows how this progression develops over time. As children become adolescents, arguments with parents tend to become both more frequent (Tesser et al., 1989) and more intense (Laursen et al., 1998).

Independence

Most adolescents achieve independence with relatively little friction in the family. Sometimes, however, things can become tense.


DOONESBURY
HEY, JEFF, WANT TO GO OUT TO DINNER TONIGHT WITH ME AND MOM?
NO.
HOW ABOUT TOMORROW NIGHT, THEN? WE'LL GO TO WHATEVER RESTAURANT YOU LIKE!
NO.
THIS WEEKEND, THEN? IT DOESN'T HAVE TO BE DINNER. WANT TO GO TO A MOVIE, OR A BALL GAME?
NO.
OKAY, WELL, DO YOU WANT ME OR MOM IN YOUR LIFE AT ANY TIME, IN ANY WAY, UNDER ANY CIRCUMSTANCES, EVER AGAIN?
8-15
DON'T TOY WITH ME, RICK.
NO, NO, I'M GENUINELY CURIOUS.
DOONESBURY © 1997 G.B. TRUDEAU. REPRINTED WITH PERMISSION OF UNIVERSAL PRESS SYNDICATE. ALL RIGHTS RESERVED.

Some families suffer as this move toward independence separates parents and children, but a much greater number adjust with a minimum of turmoil. Most of the time, parents and teenagers get along quite well, with 97 percent of American teenagers reporting that they get along either "fairly" or "very" well with their parents (Gallup International Institute, 1996). In another study, more than half of all middle-class teenagers in a worldwide survey said that family relationships were the "most important" guiding principle in their lives. Eighty percent rated family relationships as "important" (Stepp, 1996). This is good because a growing number of children will remain at least partially dependent on their parents for support until their mid-twenties, a phase called *emerging adulthood* (Arnett, 2006, 2007; Reitzle, 2006).

PAUSE NOW OR MOVE ON

Turn to page 229 to review and apply what you've learned.

Three Key Developmental Issues

WHAT'S THE POINT?

12-5 How do developmental psychology's three major issues apply to adolescence?

Let's take a quick look at the three major developmental issues as we prepare to leave adolescence behind.

Continuity and Stages

Is our development more like the stage development of a tadpole turning into a frog or more like the continuous, gradual development of a sapling imperceptibly changing over many years into a towering oak tree? In adolescence and throughout the life span, there is support for both positions. The theorists who have played such a prominent role in developmental psychology have focused on the abrupt changes as individuals move through stages. Piaget identified these jumps for cognitive development, Kohlberg was concerned with changes in moral development, and Erikson examined transitions in social development. Other researchers turn their attention to the more gradual growth that occurs within stages, similar to the slow but steady increase in strength produced by a weight-training program. Development relies on both continuity and stages.

Stability and Change

The period of adolescence is affected by both stability and change. Temperament and values are most likely to stay constant; relationships and certain behaviors are more likely to change. Many successful and happy adults were troubled people at your age.

Nature and Nurture

This pervasive issue is as important in adolescence as in other developmental periods. We can see the role of nature in the genetically determined sequence of changes that spark sexual feelings and interests. But nurture's hand is also evident: Adolescents learn to make decisions about expressing sexuality from their families and society. The expression of sexuality is determined by a complex interaction of both nature and nurture.

PAUSE NOW OR MOVE ON

Turn to page 230 to review and apply what you've learned.

The opportunities and challenges of modern American adolescence are a reflection of a complex world. Life was simpler in the nineteenth century, when educational and career opportunities were more limited, but few of us would choose to return to those more limiting times. Navigating adolescence successfully can be difficult, and most who travel this road will hit a few potholes along the way. It can also be an exciting adventure as people learn new freedoms and master new skills.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 12

Thinking About Adolescence

What Is Adolescence?

WHAT'S THE POINT?

12-1 What is adolescence, and how does our culture affect it?

- Adolescence is the transition period from childhood to adulthood.
- Adolescence begins with sexual maturation.
- The end of adolescence is more variable because people become adults at different times depending on how their society defines adulthood.

Apply What You Know

1. Which of the following aspects of adolescence is most likely to differ among cultures?
   a. how the end of adolescence is defined
   b. menarche
   c. the development of primary sex characteristics
   d. the effect of hormonal changes on secondary sex characteristics
2. True or False: Adolescence is longer in more complex societies.

Physical Development in Adolescence

WHAT'S THE POINT?

12-2 What major physical changes occur during adolescence?

- Puberty, triggered by hormones, is the period of sexual maturation during which a person becomes capable of reproducing.
- Primary sex characteristics are related to the reproductive organs.
- Secondary sex characteristics are nonreproductive, like beard development in boys and breast development in girls.

Apply What You Know

3. _____ is a girl's first menstruation.
4. Briefly describe the primary and secondary sex characteristics in boys and girls.

Cognitive Development in Adolescence

WHAT'S THE POINT?

12-3 How does adolescent reasoning differ from that of younger children?

- Adolescents reason in Jean Piaget's formal operational stage, during which adult thinking and reasoning skills develop.
- Lawrence Kohlberg described how moral reasoning develops as we mature. Adolescents usually think at the conventional moral reasoning stage.

Apply What You Know

5. Which best describes the stage that Jean Piaget stated most young people enter during adolescence?
   a. the ability to think logically and form theories about abstract questions
   b. reasoning that involves thinking about the effects our moral actions have on others
   c. a search for both identity and intimacy through exploration
   d. the risk-taking stage because of crucial sexuality decisions
6. According to Lawrence Kohlberg, most adolescents would think it's wrong to drive through a red light because
   a. it's against the law and the rules of the road.
   b. you might get caught and have to go to traffic court.
   c. we need to respect the rights of other drivers.
   d. we imagine what it's like to be in a car hit because of the car that runs the red light.

Social Development in Adolescence

WHAT'S THE POINT?

12-4 What behaviors support Erikson's idea that developing a sense of identity is the primary challenge of adolescence?

- The search for identity during adolescence has several characteristics: experimentation, rebellion, "self"-ishness, and optimism and energy.
- Adolescents change their primary attachment from their parents to their peers, which can cause turmoil, but most adolescents report positive relationships with their parents.

Apply What You Know

7. What would Erik Erikson most likely say about a teenager who dresses in ways her parents don't like or approve of?
   a. "The adolescent is trying to establish her own identity through appropriate experimentation."
   b. "The teenager does not understand the moral implications of her clothing choices and needs to move to the postconventional stage of reasoning."
   c. "The young person is experiencing hormonal changes that influence sexuality, and this affects her fashion choices."
   d. "The child can't reason abstractly and understand how she looks to other people."
8. Erik Erikson's theory explains that many adolescents seem overly focused on themselves because
   a. they are searching for their sense of personal identity.
   b. they are going through hormonal changes that affect frontal lobe development.
   c. their hypothetical reasoning skills are just beginning to develop.
   d. they haven't yet developed the postconventional reasoning skills they need.

Three Key Developmental Issues

WHAT'S THE POINT?

12-5 How do developmental psychology's three major issues apply to adolescence?

- Researchers describe distinct stages that depict development in adolescence, but continuous development also occurs.
- The period of adolescence is affected by both stability (values) and change (new friendships).
- The development of sexuality during adolescence is determined by a complex interaction between nature and nurture.

Apply What You Know

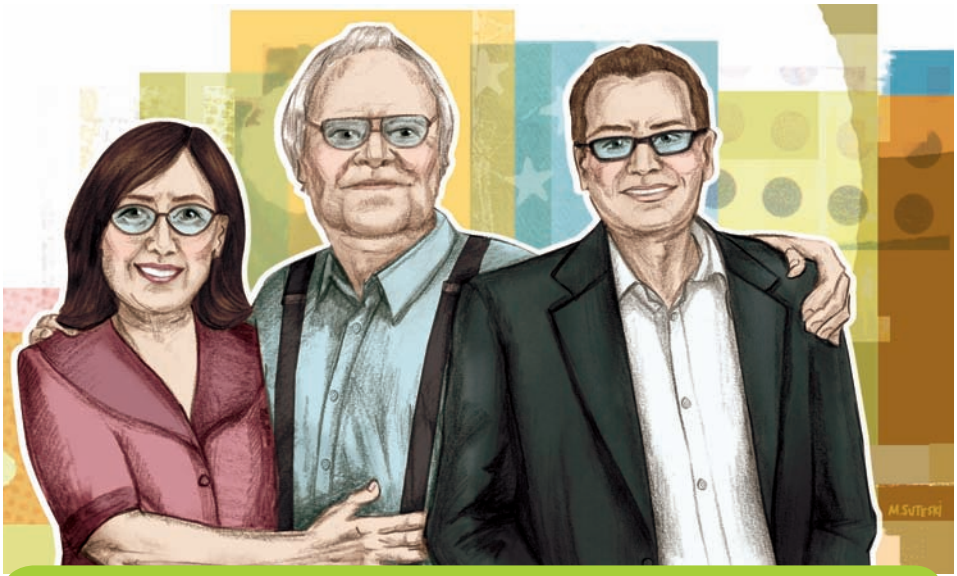
9. Which of the following factors is most likely to remain stable throughout adolescence?
   a. temperament
   b. abstract thinking skills
   c. identity
   d. risk-taking behaviors
10. True or False: Nature refers to the impact of genetics on development.

KEY TERMS AND KEY PEOPLE

adolescence, p. 214
puberty, p. 216
primary sex characteristics, p. 216
secondary sex characteristics, p. 216
sexual orientation, p. 217
identity, p. 223
intimacy, p. 225
Jean Piaget [pee-ah-ZHAY] (1896–1980), p. 218
Lawrence Kohlberg (1927–1987), p. 219
Erik Erikson (1902–1994), p. 222

MODULE 13

Adulthood and Aging



From childhood and adolescence to adulthood and senior citizenship, aging brings about many transitions.

Early Adulthood Transitions and the Social Clock

Physical Changes and Transitions

- Middle Adulthood's Physical Changes
- Later Adulthood's Physical Changes
- Diseases Related to Aging

Cognitive Changes and Transitions

- Memory
- Intelligence

Social Changes and Transitions

- College Majors, Work, and Happiness
- Love and Marriage
- A Lifetime of Well-Being
- Dying and Death

How many times have you been asked, "What are you going to do after you graduate?" You've given this some thought, right? Will you go to college or enter the work force? No doubt, you're receiving all kinds of advice. Perhaps you've even been told what type of job to take, where to go to college and what your major should be, or how you would benefit from "sitting out a year" just to take a break from learning. Making decisions about life after high school is a milestone in your continuing transition from adolescence to early adulthood, from being dependent on your parents to being dependent on yourself. In this module, we look at some other transitions that we all make as we move from early to middle to late adulthood (see **Table 13.1**).

Table 13.1

Periods of Adulthood

Period	Approximate Age Brackets
Early adulthood	20–35 years
Middle adulthood	36–64 years
Late adulthood	65 years and over

social clock The culturally preferred timing of social events such as marriage, parenthood, and retirement.

Early Adulthood Transitions and the Social Clock

WHAT'S THE POINT?

13-1 What is the concept known as the "social clock," and how does it relate to the transition from adolescence to adulthood?

As you continue your journey from adolescence to adulthood, you'll face many other important questions: When will you move out of your parents' house? Where will you live? Will you marry? If so, when? And if you decide to raise children, how many? The **social clock,** the culturally preferred timing of social events such as marriage, parenthood, and retirement, may influence your answers to these questions. For example, if you got your driver's license shortly after you turned 16 or 18 (depending on your state), you were "on time." However, if you were 34 and still didn't have your driver's license, you would be "off time" and people would be likely to ask, "What's wrong with you?" These social events or transitions can cause anxiety for those who feel they're not keeping up with their peers.

Social clocks have different settings in different cultures. For instance, in Jordan, 40 percent of all brides are in their teens, but in Hong Kong, only 3 percent of brides are this young (United Nations, 1992). The settings of a social clock can change within a culture, too. In the United States, for example, the "normal" time span for many life events, including marriage, has altered. Both men and women are marrying later in life than they did even 10 years ago (Arnett, 2004).

The transitions in early adulthood can be stressful, often because we make so many of them at once. Where you are two years from now will be different from where you were as a ninth grader. Yet your transition to adulthood will probably be less abrupt than it would have been a generation ago. Developmental psychologists have noticed that adolescents are easing more slowly into the self-sufficiency of true adulthood. A new

Culture Affects the Social Clock

In developed countries such as ours, even great-grandmothers go for their diplomas, as did this 87-year-old Smith College graduate, and teenagers are discouraged from marriage and parenting. But grandmothers don't often go to college in developing nations, such as Indonesia, and teenagers, such as this Javanese girl, often marry and have children.

MARK SCOTT/TAXI/GETTY IMAGES

ANNA KARI/IN PICTURES

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Time to Grow Up?

Some emerging adults stretch out the transition time from adolescence to adulthood.

developmental stage between age 18 and the mid-twenties, called **emerging adulthood,** is receiving a lot of attention from researchers (Arnett, 2004, 2007). Christopher Munsey (2006) has summarized the five features of emerging adulthood:

emerging adulthood A period from the late teens to the mid-twenties (and sometimes later), bridging the gap between adolescent dependence and full independence and responsible adulthood.

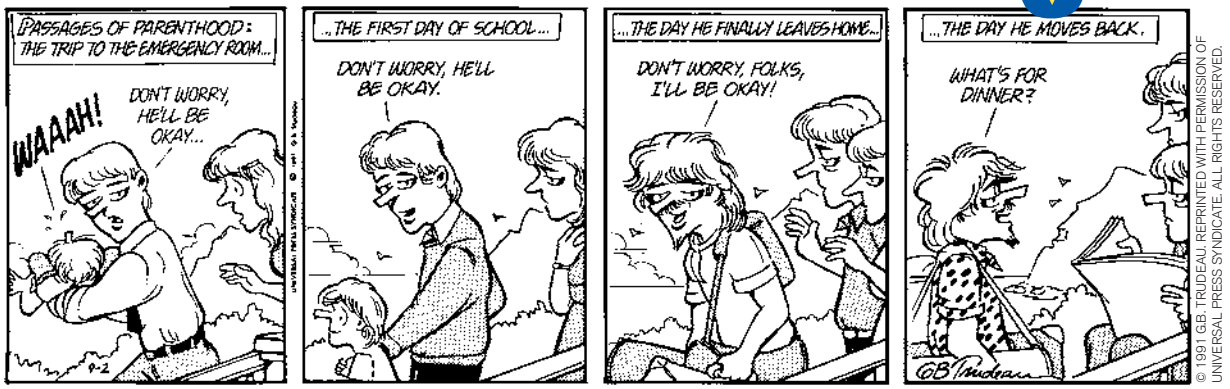
- *Age of identity exploration*—The process of deciding who you are and what you would like to get out of school, love, and work.
- *Age of instability*—Marked by moving from place to place; the frequent moves usually end once a career or a family is in place.
- *Age of self-focus*—Deciding who to be with, where to go, and what to do without being concerned about parental restrictions (or the constraints of a family).
- *Age of feeling between*—Even though you're taking responsibility for your decisions, you still don't feel like an adult.
- *Age of possibilities*—Full of optimism, emerging adults believe they will live better than their parents and will find a soul mate.

Consider my friends Ken and Mary, who are 25 years old and married. In changing careers and moving from one state to another, Ken and Mary made an 8-month "stopover" at his parents' home to prepare for their new jobs and

Time to Grow Up?

Some emerging adults stretch out the transition time from adolescence to adulthood.

DOONESBURY


PASSAGES OF PARENTHOOD: THE TRIP TO THE EMERGENCY ROOM...
WAAAH!
DON'T WORRY, HE'LL BE OKAY...
...THE FIRST DAY OF SCHOOL...
DON'T WORRY, HE'LL BE OKAY.
...THE DAY HE FINALLY LEAVES HOME...
DON'T WORRY, FOLKS, I'LL BE OKAY!
...THE DAY HE MOVES BACK.
WHAT'S FOR DINNER?
©B Trudeau

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to save money for rent in their new city. Ken and Mary would like to have children some day, but they don't yet feel "settled" enough to be parents. Ken and Mary aren't unique. Amos, another friend of mine, is 34 and has a good job, but he still brings laundry to his parents' home on the weekends. He also relies on their financial assistance periodically to make ends meet. Ken, Mary, and Amos are increasingly common examples of the changing social clock in Western cultures. They aren't adolescents, but they have not quite made the complete transition into adulthood.

PAUSE NOW OR MOVE ON

Turn to page 246 to review and apply what you've learned.

Physical Changes and Transitions

WHAT'S THE POINT?

13-2 What are the physical changes that occur in middle and late adulthood?

You're not there yet, but you are less than a decade from reaching your performance peak for reaction time, sensory awareness, and cardiac output. Most of these physical abilities will top out sometime during your twenties. If you're a world-class sprinter or swimmer, you'll notice your times slowing after you reach your physical peak, and you'll know that your body is changing. For the rest of us, the early signs of physical decline are harder to detect.

Middle Adulthood's Physical Changes

The midlife years, from around age 36 to 64, are a time of noticeable physical changes, and these changes bring their own transitions. Twenty-five years ago, I was always told to "go long" during my family's annual Thanksgiving Day touch football game. Sprinting down the field, I would look over my shoulder for a high, arching pass that would score a touchdown if I managed to catch it. Now, though, my nieces, nephews, and daughters are the touchdown threats, and I hike the ball and block for the quarterback.

Some cultures welcome the outward signs of growing older, believing that those who achieve advanced age deserve status and respect. Not so in the United States, where cheating the aging process is a billion-dollar business that just keeps growing. I can remember sitting in large gatherings as a child, trying to figure out how many people around me dyed their hair. If I played this game now, the count would be much higher. Fewer middle-aged adults, male or female, carry the heads of gray hair I saw as a child. And the camouflage doesn't stop with hair color. Some try to hide wrinkles with

cream; others stretch their skin surgically with a face-lift to appear younger.

A noticeable sign of aging in women is **menopause,** when the menstrual cycle ends, which is usually between the ages of 45 and 55. Contrary to popular belief, menopause *does not* make most women depressed or irrational. Some women do experience "hot flashes" as their bodies adjust to the decreased amount of estrogen in their hormonal systems, but study after study has found that menopausal women are no more or no less depressed than women who are not experiencing this change (Busch et al., 1994; Matthews, 1992; McKinlay et al., 1987). Most women express "only relief" once their periods stop, with a mere 2 percent expressing "only regret" (MacArthur Foundation, 1999).

There is no male reproductive event equal to menopause. Men's testosterone levels drop, but not at the sharp rate at which estrogen levels decrease in women. Although sperm counts decline, men do not lose their fertility. And for men, as for women, the notion of a "midlife crisis" is more Hollywood than reality. Midlife crises are the exception, not the norm, and they usually coincide with a traumatic event, such as the death of a spouse or a close friend of a similar age.

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Is This Middle Age?

Midlife identity crises are the exception, not the norm.

menopause When the menstrual cycle ends; also refers to the biological changes a woman experiences as her ability to reproduce declines.

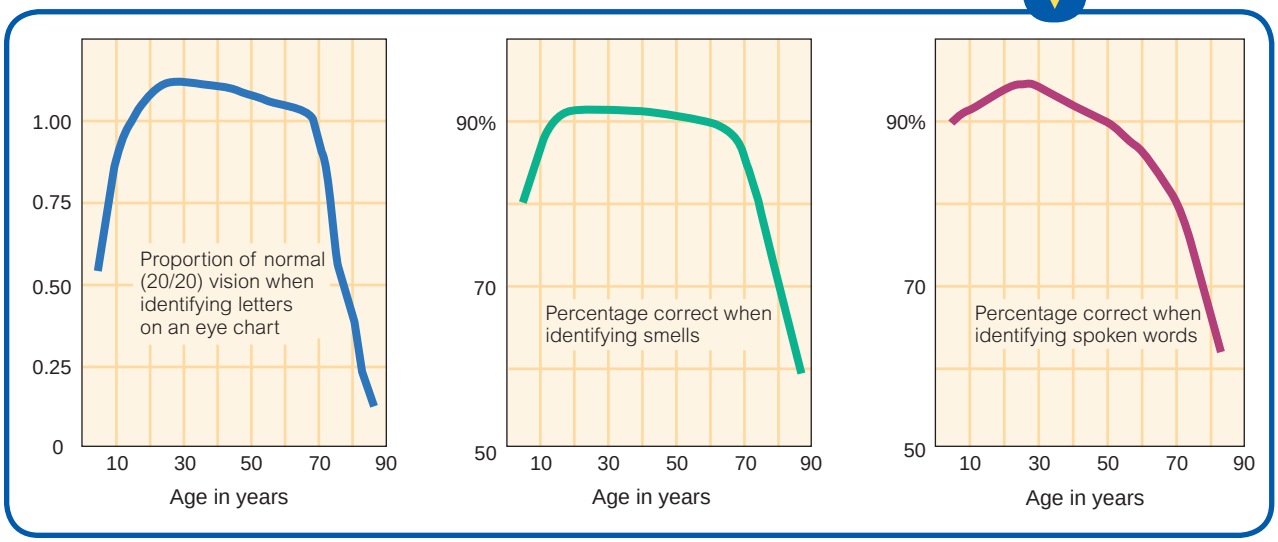
Later Adulthood's Physical Changes

When I was a young boy, my grandmother would turn on every light in the room when she saw me reading. I'd tell her there was plenty of light; she'd tell me it was too dark. Now I know that we were both correct: The light was fine for me but not for her. How could this be so? The answer lies in the physical changes that affect our senses and our health as we age.

Our sight, smell, and hearing usually begin to decline significantly once we hit age 65 (see **Figure 13.1**). That decline began in early adulthood, but most people fail to notice the small sensory loss until they are older. Muscle

Figure 13.1
Declining Senses

Our ability to see, smell, and hear declines with age. (From Doty et al., 1984.)



TONY FREEMAN

MASTERFILE (ROYALTY-FREE DIV.)

Fountain of Youth?

Exercise is important throughout the life span to maintain mental and physical health.

strength and stamina also diminish in late adulthood, and our bodies take longer to heal after injury.

So, why did Grandma turn on all the lights? Her 68-year-old corneas and lenses had become less transparent, letting in only about 30 percent of the light that entered my young eyes. To experience the same level of illumination I was experiencing, Grandma needed lights three times brighter.

Does health automatically take a downhill turn as you become advanced in years? The answer is *Yes* and *No*. Your immune system will weaken as you age, increasing your susceptibility to disease. However, by the time you hit 65, you'll have built up antibodies to all the viruses you've ever had, making you less likely to catch a common cold.

Aging also slows travel on our neural pathways. Our chromosomes' protective tips, called *telomeres*, fray much like a the end of a rope as a person gets older, especially if the person smokes, is under stress, or is overweight. Without perfect telomeres, the chromosomal cells may die without an identical genetic replacement (Blackburn et al., 2007; Zhang et al., 2007). Thus, older people require more time to react, remember names, and solve puzzles (Bashore et al., 1997; Verhaeghen & Salthouse, 1997). Portions of the brain start to atrophy, or waste away (Schacter, 1996). If you live to be 80, your brain will weigh 5 percent less than it does now. Cell loss in the memory regions of the brain is particularly detrimental.

You can compensate for lost brain cells and neural connections by remaining physically and mentally active (Jarvik, 1975; Pfeiffer, 1977). Exercise appears to foster brain cell development while helping prevent heart disease and obesity (Kempermann & Gage, 1999). Exercise may not be the fountain of youth, but it is usually a fountain of health.

Diseases Related to Aging

Our fortieth president, Ronald Reagan, wrote a letter to the American people in 1994, stating, "I now begin the journey that will lead me into the sunset of my life." At age 83, President Reagan was telling the world he had **Alzheimer's disease,** a progressive and irreversible brain disorder characterized by

gradual deterioration of memory, reasoning, language, and, ultimately, physical functioning.

Deteriorating neurons include those that produce a vital brain chemical (acetylcholine). Without this chemical, thinking and memory are greatly impaired. Almost 3 percent of the world's population develops Alzheimer's disease by age 75.

Certain drugs slow Alzheimer's progression, but there is no known cure. Research is showing that challenged and active minds—that is, the minds of people who read a lot and continue to learn across the life span—are at lower risk for Alzheimer's onset (Wilson & Bennett, 2003). Inactive and obese individuals are more likely to experience Alzheimer's disease (Marx, 2005). Gene abnormalities and dead tissue on the ends of neurons (that prevent normal functioning) have been linked to Alzheimer's disease, and a simple blood test can now be used to at least partially determine the likelihood of developing the disease (Grady, 2007). Would you want older relatives to take such a test? Would you take the test?

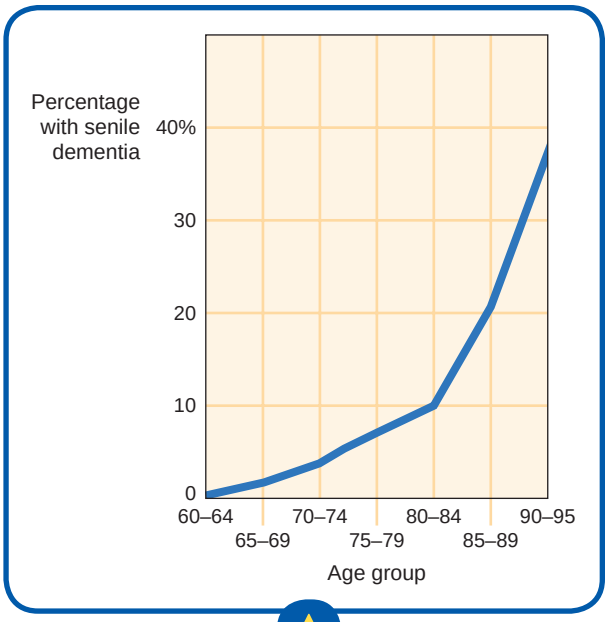


Figure 13.2
Senile Dementia and Age

The likelihood of senile dementia increases as we grow older. (From Jorm et al., 1987, based on 22 studies in industrialized nations.)

Senile dementia is another type of mental disintegration (see **Figure 13.2**). Dementia can be caused by alcoholism, tumor, strokes, or anything else that results in a substantial loss of brain cells.

Not every older adult who forgets song titles or the location of that misplaced address book has senile dementia or Alzheimer's disease. Some memory loss is a normal part of aging. And the news about cognitive functioning isn't all bad, either. Look next at what happens to our thinking processes as we age.

PAUSE NOW OR MOVE ON

Turn to page 246 to review and apply what you've learned.

Cognitive Changes and Transitions

WHAT'S THE POINT?

13-3 What are the cognitive changes that occur in middle and late adulthood?

Most 65-year-olds cannot run as fast as 20-year-olds. Do thinking skills slow just as much as physical skills? What do you think: "Can't teach an old dog new tricks" or "Never too late to learn"? Researchers have been taking a close look at how our thinking skills decrease as we age, and the findings show that the answer partly depends on what kind of memory and intelligence we are discussing.

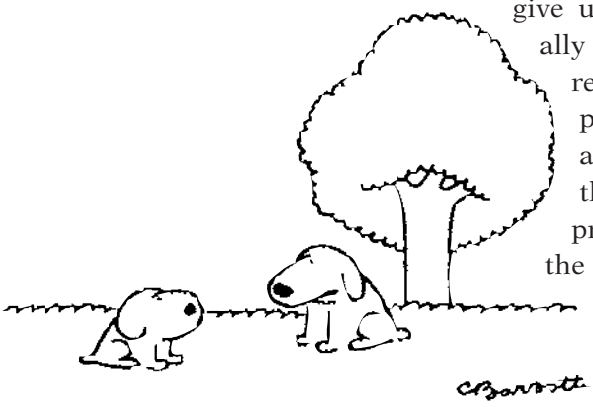
Alzheimer's disease A progressive and irreversible brain disorder characterized by gradual deterioration of memory, reasoning, language, and, finally, physical functioning.

senile dementia Mental disintegration that accompanies alcoholism, tumor, stroke, aging, and, most often, Alzheimer's disease.

Memory

When you're 50, what will you remember about your high school days? Will it be getting your driver's license? Your first job? Graduation? When asked to remember the most important events in their lives, people in their fifties and older usually recall events from their teens or early twenties (Conway et al., 2005). This is an important time of life!

People your age tend to do better on *recall* memory tasks—tasks that give us no clues to jog our memories—than people in virtually any other age group. One study found that young adults recalled people's names significantly better than did people in their seventies (Crook & West, 1990). Another study asked British people to tell about where they were, whom they were with, and what they were doing when a popular prime minister resigned from office. Participants had to tell the story twice: once within hours of the resignation and the second time 11 months later. Among participants in their twenties, 90 percent told the same story they had related 11 months earlier. Interestingly, only 42 percent of those 50 and over told stories with the same details (Cohen et al., 1994). In the older group, recall of the event changed over time.



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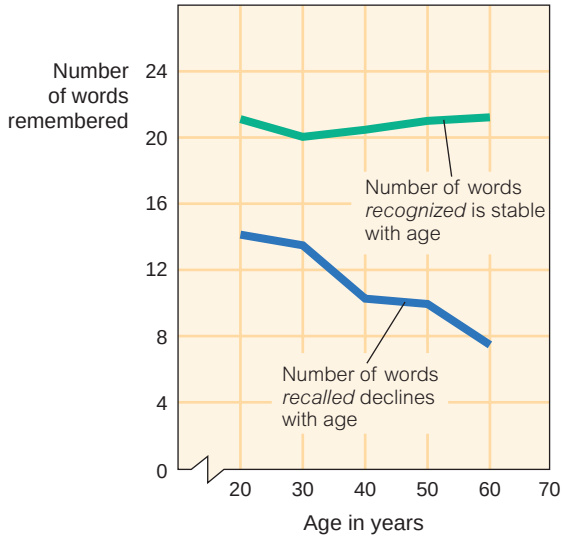
"My advice is to learn all the tricks you can while you're young."

Research reveals a clear tendency for younger adults to have better recall, but what does it tell us about other kinds of memory? One study revealed that *recognition* remains stable from age 20 to 60 (Schonfield & Robertson, 1966). Older adults had difficulty recalling a list of words, but they could recognize them in multiple-choice questions just as easily as people 40 years younger did (see **Figure 13.3**). Older adults maintain the ability to remember meaningful materials (like anniversaries) yet lose the skills necessary to remember meaningless information (like a series of nonsense syllables) (Graf, 1990; Labouvie-Vief & Schell, 1982; Perlmutter, 1983). As a teen, you are better at remembering to do something than your 70-year-old relatives (Zimmerman & Meier, 2006). Prospective memory, which is the ability to remember habitual tasks like taking medicine every day and time-oriented tasks like appointments, also declines in older adults (Einstein & McDaniel, 1990; Einstein et al., 1995, 1998).

Figure 13.3
Better at Recognition

In late adulthood, the ability to recognize words does not decrease as rapidly as the ability to recall words. (From Schonfield & Robertson, 1966.)



It's important to note that in all of these studies we are only talking about average tendencies. I know people in their seventies who have incredible memories for historical facts and events. On the flip side, I have teenage students who forget to sign their names on an essay test, even when I tell them that their names will count for a point on their grade. Some 60-year-old retirees outperform most college students on a memory test; others will not out-remember even middle school students. These individual differences also show up in measures of intelligence.

Intelligence

fluid intelligence The ability to reason speedily and abstractly.

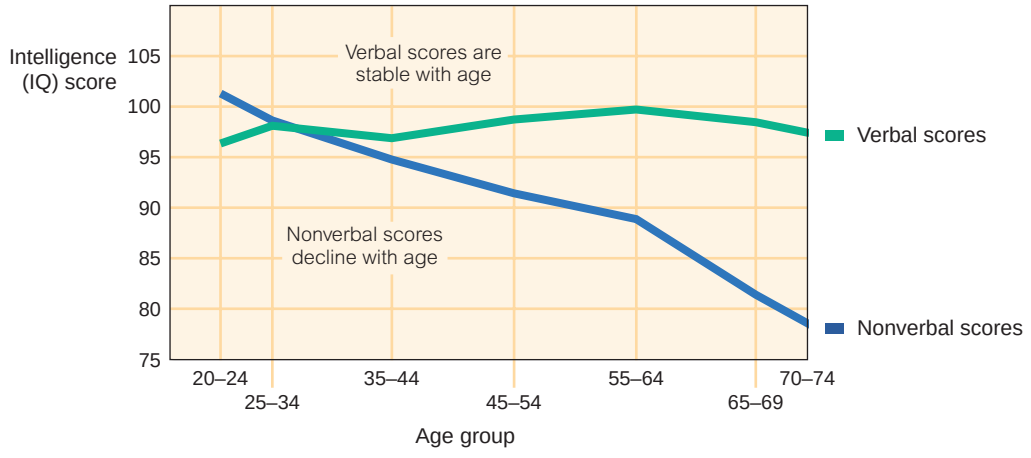
crystallized intelligence Accumulated knowledge and verbal skills.

As with memory, the question of whether intelligence declines as we age depends on the kind of intelligence we're considering. **Fluid intelligence** is our ability to reason speedily and abstractly. We use fluid intelligence to solve novel logic problems like Sudoku puzzles. This kind of intelligence tends to *decrease* during late adulthood. **Crystallized intelligence,** our accumulated knowledge and verbal skills, tends to *increase* with age (Cattell, 1963; Horn, 1982). Intelligence test scores show this difference. On one commonly used test, the Wechsler Adult Intelligence Scale (WAIS), verbal intelligence scores—a measure of crystallized intelligence—remain stable with age. Nonverbal intelligence scores (for example, the time it takes to put a puzzle together) reflect fluid intelligence and decline over time (see **Figure 13.4**). Negative emotions, such as anger, anxiety, and depression, are less likely to inappropriately distort our decision making as we age (Blanchard-Fields, 2007).

Perhaps increased crystallized intelligence is one of the reasons most chief executive officers of companies and international leaders are in the latter half of their life span. Similarly, literature, like William Shakespeare's *Julius Caesar,* often depicts sages as older people who dole out advice for everyone to follow. Professions that favor one type of intelligence over another also differ in their patterns

Figure 13.4
Age and Intelligence Test Scores

Even after adjusting for educational background, verbal intelligence test scores (a measure of crystallized intelligence) remain steady with age. (Adapted from Kaufman et al., 1989.)



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Nonverbal Intelligence

JUPITERIMAGES/GETTY IMAGES

Verbal Intelligence

of creativity. Novelists, historians, and philosophers tend to produce their best work in their forties, fifties, sixties, and later, whereas mathematicians and scientists often do their most creative work in their twenties and thirties (Simonton, 1988, 1990).

PAUSE NOW OR MOVE ON

Turn to page 246 to review and apply what you've learned.

Social Changes and Transitions

WHAT'S THE POINT?

13-4 What are the likely effects of significant life events (such as marriage, meaningful employment, and the aging process) on happiness and life satisfaction?

Many transitions of adulthood hinge on significant *life events,* rather than physical or cognitive changes. Family and work-related events often bring major life-style alterations. For instance, marriage brings both the happiness of a close relationship and the challenge of blending two lives together. Starting a new job creates new friends, expectations, and demands. The birth of a child starts a series of new responsibilities that last a lifetime. All of these life events involve social transitions. Next, we discuss two major parts of adulthood—work and love.

College Majors, Work, and Happiness

Deciding on a first career is an important and difficult decision. You may have a twinge of envy for a classmate who already knows she is going to be an engineer and who will declare a major in the first month of college. But you can take heart in knowing that your classmate is the exception, not the rule. Most first- or second-year college students

1. change their initial major field of study.
2. cannot accurately predict the careers they will have later in life.
3. change careers after entering the work force.

Postcollege employment is often unrelated to college major (Rothstein, 1980). Still, people will continue to ask you what you are going to do for a living. Many people think that a career should make someone feel self-fulfilled and satisfied with life. One study addressing the work-happiness connection compared women who were employed and those who were not employed (by choice). The researchers concluded that it's the quality of the experience, as a paid worker or as a stay-at-home mother, that influences happiness. At the

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end of the day, happiness is about having work that is challenging, provides a sense of accomplishment, and fits your interests (Baruch & Barnett, 1986; Wrzesniewski & Tosti, 2005).

Challenge, Accomplishment, and Happiness

Happiness at work depends on whether you feel good about what you've accomplished at the end of the day and whether you felt challenged while doing it.

Love and Marriage

Do opposites really attract? Yes, but only if we're talking about magnets. It doesn't really work for love. And love by any name—commitment, devotion, intimacy, or attachment—is vital to a happy adulthood. Love lasts longer and is most satisfying when marked by

- intimate self-disclosure (that is, sharing embarrassing moments or deep secrets).
- shared emotional support (like empathy when things go wrong) and material (monetary) support.
- similar interests (leisure activities) and values (political, moral, and religious).

For many, love translates into marriage: Ninety percent of our population gets married at least once. Those marriages are more likely to last if both members are over 20, have a stable income from good employment, dated a long time before getting married, and are well educated (Myers, 2000). Out of every two marriages in the United States, one will end in divorce (Bureau of the Census, 2007). Three out of four who divorce will marry a second time (Vemer et al., 1989).

A Happy Union

Married men and women report greater happiness than unmarried, separated, or divorced individuals.

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Despite the divorce epidemic, the bond of marriage remains a popular living arrangement, just as it has in various human societies through the centuries. One reason the institution of marriage endures is because of the well-being it brings to the couple. Married men and married women report greater happiness than unmarried, separated, or divorced individuals (Inglehart, 1990). Females in committed same-sex relationships also report greater well-being than individuals who remain alone (Peplau & Fingerhut, 2007; Wayment & Peplau, 1995).

Must a marriage be free of conflict to last? Few marriages avoid conflict, but one indicator of marital success is the way that

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Sharing the Load

Couples who balance household duties have a more satisfying marriage and better relationships with their children.

couples interact. Stable marriages have a five-to-one ratio of positive to negative interactions. Marriages last when each partner compliments, hugs, and smiles five times more than he or she insults or criticizes (Fredrickson & Losada, 2005; Gottman, 1994).

Love and marriage often result in the birth of children, an event that is usually met with great happiness. However, raising a child requires a serious investment of time, money, and emotion, which can exact a heavy toll on a couple's satisfaction with each other. As couples make the transition to being parents, they may disagree about the division of labor in the new family structure. Many women who work outside the home still carry the lion's share of the child-raising and housekeeping load (Belsky et al., 1986; Hackel & Ruble, 1992). Couples who make the effort to spread the workload more evenly can anticipate a double reward: a more satisfying and successful marriage and better parent-child relationships for both parents (Erel & Burman, 1995).

The "empty nest syndrome," when children move out of the house, is also a significant event. Yet you may be surprised to hear that an empty nest brings more happiness than sadness (Adelmann et al., 1989; Gilbert, 2006; Glenn, 1975). Middle-aged women with children at home report lower levels of happiness and less marital satisfaction than those with an empty nest. If the relationship with the children moving out is positive and close, parents are likely to experience a "postlaunch honeymoon" (White & Edwards, 1990).

A Lifetime of Well-Being

Aging often brings a shrinking income, a deteriorating body, less energy, and the loss of friends and family to death. But retired adults still have a strong sense of well-being.

In one study, researchers collected interview data from almost 170,000 people in 16 nations and found that, on average, older people are every bit as happy and satisfied with life as younger folks are (Inglehart, 1990) (see **Figure 13.5**).

Figure 13.5
Satisfaction Remains High

This multinational survey shows that age does not matter much when it comes to being satisfied with your life. (From Inglehart, 1990.)

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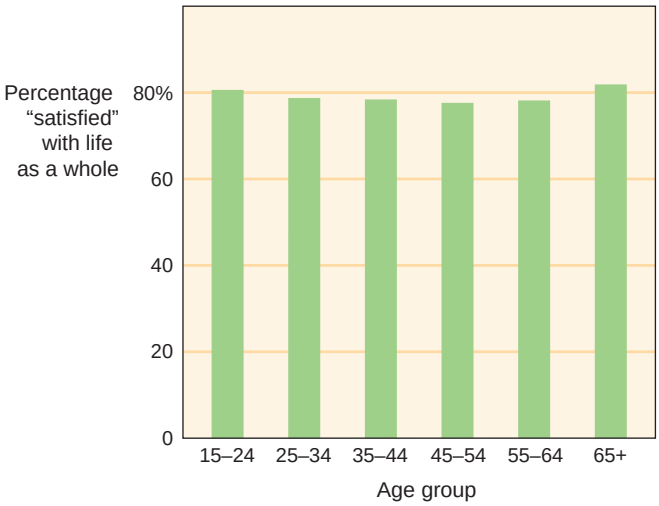

Another study showed that young people around the age of 25 are far more likely to report feeling worthless, sad, or nervous than are those in their seventies (Mroczek & Kolarz, 1998). Is it any wonder that—with some of the biggest stressors of life behind them, like choosing a career and a partner for marriage—the older set is "satisfied" with life as a whole? We can all take comfort in these findings as we look forward to our own aging future. (See Psychology in the Real World: Ageism.)

We also tend to mellow as we age (Costa et al., 1987; Diener et al., 1986). Emotions are less extreme and more enduring later in life. Older people tend to experience life more evenly—the good things don't make them overly happy, and bad things don't drag them down. An older adult is less likely to feel on top of the world but also less likely to feel depressed (Blanchflower & Oswald, 2008). This middle way appears to offer contentment, even if intense joy is rare.

As an older adult, well-being may also depend on how you reflect on your past. Will you be satisfied with what you've done, or will you look back with regret? Interestingly, most of the regrets retirees express run along the lines of "I wish I had hiked up Pike's Peak" or "I'm sorry I didn't tell my father more

Psychology in THE REAL WORLD

Ageism

> Common beliefs about the aging process result in negative stereotypes—oversimplified and biased views of what people are like. . . . The stereotype would have us believe that old people are tired, cranky, passive, without energy, weak, and dependent on others. (Schaie & Willis, 1996)

Does the preceding quote reflect your beliefs about elderly people? If so, your thoughts also reflect *ageism,* the tendency to categorize and judge people on the basis of their chronological age (Berger, 2012). Just as racism works against those who are not of the race in power, ageism prevents older people from being as productive as they could be, blocks happiness, and works against self-esteem. Ageism does not allow its targets to live their lives the way they want (Butler et al., 1991).

Does ageism affect only older adults? Absolutely not. Where I live, I can go outside and walk around after 11:00 P.M., but my under-18 child cannot because of our local curfew. If we walk into a retail store together to buy tennis shoes, I will be waited on before my daughter. Ageism affects people of all ages.

Still, ageism does most of its damage to older adults. By prejudging them, it reduces their self-esteem and their ability to participate in society. It also fosters an attitude that accepts ageist policies, such as mandatory retirement. However, the tide seems to be turning. As baby boomers age and swell the numbers of retired Americans, stereotyping the elderly is becoming more difficult. The clichéd image of the rocking-chair grandparent is being replaced by mountain-climbing, marathon-running older people living life to the fullest.

As the number of retirees increases, society is finding it more difficult to ignore the needs of this segment of the population. The politician who endorses legislation that negatively affects the over-65 set stands to lose a sizable number of votes from a group that regularly makes its opinion known at the polls. Finally, advances by *gerontologists,* those who scientifically study old age, may help change the perception of older people as "tired, cranky, and passive." This change in perception may also help all of us identify with older people as our future selves instead of elderly others (Blaikie, 1999).

Thinking About POSITIVE PSYCHOLOGY

Adding Life to Your Years

Some would say that "successful aging" is an oxymoron. Not so, says Harvard psychiatrist and world-renowned aging expert George Vaillant, whose research has shown that "you can add life to your years instead of just years to your life" (Cromie, 2001).

Vaillant has been involved in the most comprehensive study on aging ever conducted for over 40 years. The original study began in the 1930s, with over 800 students at Harvard tracked from adolescence until old age or death. What leads to a healthier, longer life? The results have been both surprising and reassuring.

"I had expected that the longevity of your parents, the quality of your childhood, and your cholesterol levels would be very influential," says Vaillant. "So I was very surprised that these particular variables weren't more important than they were" (Healthy Aging Health Center, 2002).

Given that obsessing over things we can't control such as genetic factors is time poorly spent, Vaillant (2002) recommends several tips to increase the likelihood of moving successfully from middle age to your eighties and nineties:

- Pursue education as far as your intelligence permits.
- Stop smoking, if you've started.
- Maintain strong social relationships (including a stable marriage).
- Don't use alcohol to the point of shaming yourself or your family.
- Keep your weight down.
- Stay physically active: Walk, mow the grass, or play tennis.
- Use ingenuity to cope with stress (make lemonade out of lemons).

With regard to the last tip about stress, Vaillant emphasizes that stressful events were not a great predictor of long and healthy lives. According to Vaillant, "Some people had a lot of stress, but aged very well. But how you deal with that stress does matter quite a bit" (Healthy Aging Health Center, 2002).

often that I loved him." Most regrets seem to focus on things the person *didn't* do rather than on mistakes made while actively pursuing a goal (Gilovich & Medvec, 1995). (For more on aging and well-being, see Thinking About Positive Psychology: Adding Life to Your Years.)

Dying and Death

Few escape the sadness of having to cope with the death of relatives or friends. Invariably, one spouse outlives the other, a grief suffered five times more often by women than by men. When the death is sudden and unexpected, grief and subsequent depression can be particularly hard to handle and may continue for years (Lehman et al., 1987).

Reactions to death vary from culture to culture. In some parts of Africa, death brings status to an elder, who joins the ancestors in watching over those still living in the village (Opoku, 1989). Some cultures encourage a "stiff upper lip" and hiding of grief; others, including many Muslim nations, expect outward and obvious expressions of grief by both men and women (Nobles & Sciarra, 2000). No matter what the culture, there are always individuals who grieve significantly more or significantly less than others (Ott et al., 2007).

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Hospice Care

This nurse is checking in on a man with a terminal disease. The fresh flowers on the mantel help create a more pleasant atmosphere than that of a typical hospital.

In the United States, attitudes toward death appear to be changing. There is a greater openness toward the inevitability of death and facing it with dignity. Many patients with terminal illnesses are choosing *hospice care* instead of an impersonal and lingering hospital death. In hospice care, patients receive comforting medical attention (often in their own home) but avoid temporary death-defying interventions. Hospice care strives to make the dying person's remaining days as pleasant as possible while keeping family and friends informed and encouraging them to visit. Part of the hospice philosophy is helping the dying prepare for death while maintaining human dignity.

Although we know that everyone eventually dies, dealing with the death of a loved one can be very difficult. One popular misconception about grieving is that those who express strong grief immediately get rid of their grief more quickly. This simply is not true (Wortman & Silver, 1989). Nor is there any evidence to support the idea that we progress through predictable stages, like anger, denial, and acceptance (Nolen-Hoeksema & Larson, 1999). Some people grieve briefly, while others grieve for months or years. Both counseling and the passage of time possess healing power (Brown et al., 2008). Kathleen Berger (2012) reminds us of the value of grief:

> No matter what rituals are followed or what pattern is evident in human reactions to death, the result may give the living a deeper appreciation of themselves as well as of the value of human relationships. . . . [T]he lessons of death may lead to a greater appreciation of life, especially of the value of intimate, caring relationships. (p. 25 of the epilogue)

What are the lessons of death from mourners? We should learn from the grieving, who say, "I should have told him how much I loved him." Tending to our important human relationships, resolving differences, and expressing appreciation to those we love may help us avoid devastating regret later in life.

PAUSE NOW OR MOVE ON

Turn to page 247 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 13

Thinking About Adulthood and Aging

Early Adulthood Transitions and the Social Clock

WHAT'S THE POINT?

13-1 What is the concept known as the "social clock," and how does it relate to the transition from adolescence to adulthood?

- The culturally preferred timing of social events, referred to as social clocks, differs across cultures and historical periods.
- Developmental psychologists refer to the stage between adolescence and adulthood as emerging adulthood, a period that includes identity exploration, instability, self-focus, a feeling of being between, and a feeling of possibility.

Apply What You Know

1. Which of the following is most likely to be influenced by your culture's social clock?
   a. giving birth to a first child
   b. going through menopause
   c. being diagnosed with Alzheimer's disease
   d. declining fluid intelligence
2. True or False: Someone who, after graduating from college, moves back in with her parents to figure out what she wants to do with her life might be going through what's referred to as the dependent adulthood stage.

Physical Changes and Transitions

WHAT'S THE POINT?

13-2 What are the physical changes that occur in middle and late adulthood?

- We reach our physical peak (in reaction time, sensory awareness, and cardiac output) in our twenties, and these attributes begin to decline in our mid- to late thirties.
- Some cultures value the signs of aging, but others resist them.
- Women experience menopause in middle adulthood, usually between the ages of 45 and 55. There is no male equivalent of menopause, although testosterone levels and sperm count drops somewhat as men age.
- In late adulthood, our eyesight weakens as our eyes let in less light. Our immune system also weakens, and the neural pathways in our brain slow.

Apply What You Know

3. What is a common misconception about menopause?
   a. Menopause leads to regret, confusion, and depression in most women.
   b. Menopause causes declines in intelligence.
   c. Menopause is influenced by cultural social clocks.
   d. Menopause leads to senile dementia.
4. The effects of Alzheimer's disease are most related to _____.

Cognitive Changes and Transitions

WHAT'S THE POINT?

13-3 What are the cognitive changes that occur in middle and late adulthood?

- Our performance on memory recall tasks worsens as we age, but our performance on memory recognition tasks remains stable as we age (at least between the ages of 20 and 60).
- Fluid intelligence tends to decrease during late adulthood, while crystallized intelligence tends to increase with age.

Apply What You Know

5. Which of the following intelligence-related tasks would probably be harder for *older* people than *younger* people?

a. recalling the name of someone they made an appointment with last week
b. remembering their anniversary
c. recognizing a picture of their kindergarten teacher
d. determining whether a picture of an object matches the label of the object

6. Which of the following tasks would probably be harder for *younger* people than *older* people?

a. solving a crossword puzzle
b. listing 50 words that were just shown on flash cards
c. putting a jigsaw puzzle together
d. figuring out the answer to a new logic problem

Social Changes and Transitions

WHAT'S THE POINT?

13-4 What are the likely effects of significant life events (such as marriage, meaningful employment, and the aging process) on happiness and life satisfaction?

- Research indicates any work that is challenging, provides a sense of accomplishment, and fits our interests will likely increase our general happiness.
- Romantic relationships last longer when they include high levels of self-disclosure, emotional support, and similar interests. Men and women in committed relationships report greater well-being than individuals who remain alone.
- Older people report happiness and life satisfaction levels similar to the levels reported by younger people.
- Reactions to death vary from culture to culture and vary widely among different people.

Apply What You Know

7. Which of the following best describes the research findings related to work and happiness?

a. Interesting and challenging work is most likely to increase happiness levels.
b. Happiness leads to certain work decisions, not the other way around.
c. Higher-paying careers lead to increased happiness levels.
d. Work and happiness aren't strongly related; social relationships determine happiness.

8. Psychological research has conclusively _____ the theory that most people go through predictable stages of grieving, such as anger, denial, and acceptance.

KEY TERMS

social clock, p. 232
emerging adulthood, p. 233
menopause, p. 235
Alzheimer's disease, p. 237
senile dementia, p. 237
fluid intelligence, p. 239
crystallized intelligence, p. 239

Learning and Language

MODULES

14 Classical Conditioning
15 Operant Conditioning
16 Observational Learning
17 Language Development

If you ask a dozen friends what the word *learning* means, most of them will probably respond by talking about cognitive (mental) processes. One might say, "Learning is when you understand something." Another might reply, "Learning is comprehension of a topic." A third might argue, "You've learned something when it's been memorized." Surprisingly, many of the psychologists who pioneered the study of learning steered in another direction. To them, it was difficult to scientifically study these "between the ears" phenomena. Learning is usually reflected in what a person does, so psychologists have defined it as a relatively permanent change in behavior caused by experience. The next three modules explore three different ways that these changes can occur: classical conditioning, operant conditioning, and observational learning.

Then we will turn our attention to our remarkable ability to learn and use language. No species on the planet can communicate with the flexibility and creativity human language allows. (When was the last time you saw a fish reading a book or a dog talking on a cell phone?) If you've ever marveled at a young child's growing ability to process and utilize language, you already understand how magical the development of language is. Ready? Let's start talking!

MODULE 14

Classical Conditioning

Experiencing Classical Conditioning

Components of Classical Conditioning

Classical Conditioning Processes

- Acquisition
- Extinction

Ivan Pavlov's Discovery

Generalization and Discrimination

John Watson and the Classical Conditioning of Emotions

Cognition and Biological Predispositions

- Cognition and Classical Conditioning
- Taste Aversion and the Role of Biology

Does the name Pavlov ring a bell with you? This module, which includes the story of Ivan Pavlov and his salivating dogs, will teach you the meaning of that old and not-so-very-funny punch line.

Experiencing Classical Conditioning

WHAT'S THE POINT?

14-1 What is classical conditioning?

My freshman dorm in college was a cheaply built affair, and the college had cut costs on plumbing for the large, communal bathrooms on each floor. The cold water pipes were too small to supply enough water to both the showers and the toilets, which created a real problem if you were showering when someone flushed a toilet. The toilet would siphon off most of the cold water, and the shower temperature would momentarily turn hot enough to scald.

This reality led to a rule: When someone was about to flush a toilet while a dormmate was in the shower, he was to yell, "Flush!" to warn the showerer. This was a good solution, once you learned to respond appropriately. But I had not made the connection the morning of my first shower. I heard the word "Flush!" as I languished half asleep in the water, but I did not associate

learning A relatively permanent change in behavior caused by experience.

classical conditioning A type of learning in which a stimulus gains the power to cause a response.

stimulus Anything in the environment that one can respond to.

response Any behavior or action.

it with me and my shower. When I was struck by the painfully hot water I jumped out of the way, but my jump was a reflexive, automatic response to the hot water. I still had not made the connection.

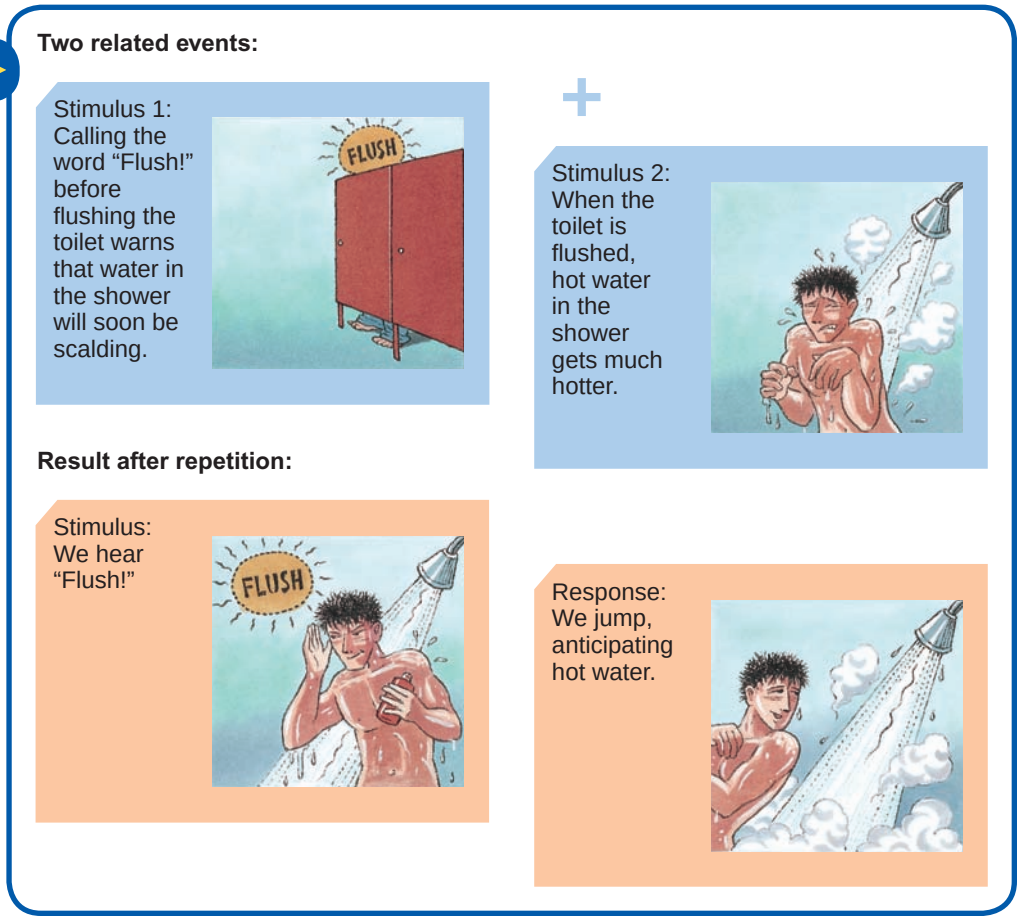
Much learning depends on these connections or associations that are formed when two events are linked. This is why we often associate habitual behaviors, like always following the same route between classes or always turning off the TV as dinner is about to be served, with particular contexts or environments (Wood & Neal, 2007). So, was I able to make the connection in my dorm?

You bet I was. After experiencing a hot water dousing a few more times, **learning** occurred. When a dormmate yelled, "Flush!" I instantly jumped to the side, with time to spare before the water temperature spiked. I did not realize it at the time, but I had experienced **classical conditioning,** a type of learning by association where a stimulus gains the power to cause a response. I had come to associate a new **stimulus** (the word *flush*) with another stimulus (hot water). "Flush!" was now a reliable predictor that scalding water was coming, and I began to respond to the word in the same way I had responded to the hot water itself. After repeated pairings, the two stimuli were associated in my mind, and each now produced the same **response**—an immediate jump to the side. This change in behavior was proof that learning had occurred.

Classical conditioning is learning (as evidenced by my changed behavior) in which a stimulus ("Flush!") gains the power to cause a response (jumping away) because it predicts another stimulus (scalding water) that already produces the response (jumping away). Whew, that's a mouthful—but at its center it's really not too complicated (see **Figure 14.1**). One stimulus begins

Figure 14.1
An Example of Classical Conditioning

Classical conditioning is a type of learning in which a stimulus gains the power to cause a response. In this example, classical conditioning led me to respond to the word *flush* in the same way I responded to painfully hot water.


Two related events:
Stimulus 1: Calling the word "Flush!" before flushing the toilet warns that water in the shower will soon be scalding.
FLUSH
+
Stimulus 2: When the toilet is flushed, hot water in the shower gets much hotter.
Result after repetition:
Stimulus: We hear "Flush!"
FLUSH
Response: We jump, anticipating hot water.

to produce the same response as another stimulus because the learner has developed an association between the two.

Classical conditioning can help us understand a variety of behavioral and emotional responses.

PAUSE NOW OR MOVE ON

Turn to page 263 to review and apply what you've learned.

Components of Classical Conditioning

WHAT'S THE POINT?

14-2 How are the four main components of classical conditioning defined?

Classical conditioning is a straightforward, logical process. It is easier to understand after you have mastered a few key terms. Because we will use these terms over and over throughout our discussion of learning, it is a good idea to read through this section on the components of classical conditioning and the next section on the processes of classical conditioning two or three times. Pause at the end of each paragraph and reflect for a moment on the meaning of each term that has been introduced.

- **Unconditioned stimulus (US)**—The US is a stimulus that triggers a response reflexively and automatically, just as scalding water in a shower makes someone jump away. Hot shower water is a US for jumping away. Classical conditioning cannot happen without a US. The only behaviors and emotions that can be classically conditioned are those that can be reliably produced by a US.
- **Unconditioned response (UR)**—The UR is the automatic response to the US. If hot water is the US, jumping away is the UR. Again, notice that the relationship between the US and the UR is *reflexive and automatic,* not learned.
- **Conditioned stimulus (CS)**—The CS is a previously neutral stimulus that, through learning, gains the power to cause a (conditioned) response. On my first day in the dorm, the word *flush* was a neutral stimulus—I did not associate it with showers, and it did not make me jump away. Thousands of other sights and sounds around the dormitory were equally neutral stimuli for jumping away. The process of classical conditioning changed the word *flush* from a neutral stimulus to a CS. (This constitutes learning!) All those other neutral stimuli remained neutral. In basic classical conditioning, the neutral stimulus and the CS are always the same thing. The term *neutral stimulus* describes the stimulus *before* conditioning, and the term *CS* describes the stimulus *after* conditioning.
- **Conditioned response (CR)**—The CR is the response to the CS. In basic classical conditioning, it is the same behavior that is identified

unconditioned stimulus (US) A stimulus that triggers a response reflexively and automatically.

unconditioned response (UR) An automatic response to the unconditioned stimulus.

conditioned stimulus (CS) A previously neutral stimulus that, through learning, gains the power to cause a response.

conditioned response (CR) The response to the conditioned stimulus.

as the UR. If I jump because of hot water (a US), my jumping is a UR. However, if I have learned to jump when someone yells, "Flush!" (a CS), my jumping is now a CR.

PAUSE NOW OR MOVE ON

Turn to page 263 to review and apply what you've learned.

Classical Conditioning Processes

WHAT'S THE POINT?

14-3 What are the two basic processes in classical conditioning?

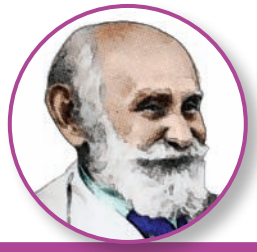
Now that you understand the four main components of classical conditioning, you need to know a little more about two basic processes in this type of learning: acquisition and extinction.

Acquisition

The most basic process in classical conditioning is **acquisition,** the process of developing a new, learned response. Acquisition occurs when a neutral stimulus is repeatedly paired with a US. Each pairing is called a *trial*.

In my dorm, I *acquired* the new CR when a neutral stimulus—the word *flush*—was repeatedly paired with the US of hot water. Notice that we do not yet refer to the word *flush* as a CS because we have yet to demonstrate that the response, jumping away, was caused by anything other than the US (hot water).

To see if a CR has actually been acquired, you could conduct a test trial. In this case, you would shout the word *flush* to a person (me!) in the shower without presenting scalding water (meaning you wouldn't flush the toilet). Then you would observe whether anything happened. If there is no response (no jumping away), it means the word is not yet a CS. However, if the person in the shower does jump away, this means "Flush!" has become a CS. The person jumps away because he heard the word, so the act of jumping away is a CR (not a UR). "Flush!" has become a CS, and the jumping away has become a CR. You have shown that the acquisition process in classical conditioning has occurred. Once acquired, the CR will be maintained only if the CS continues to be paired with the US on some trials.



SOVFOTO

IVAN PAVLOV (1849–1936) Russian physiologist and learning theorist famous for the discovery of classical conditioning, in which learning occurs through association.

acquisition The process of developing a learned response.

extinction In classical conditioning, the diminishing of a learned response after repeated presentation of the conditioned stimulus alone.

Extinction

In classical conditioning, **extinction** is the diminishing of a learned response. Extinction occurs as the CS loses its power to trigger a CR. Recall that when we want someone to acquire a CR, we repeatedly pair a neutral stimulus with the US.

But if we want to reverse this learning, we must weaken the strength of the association between the two stimuli. We do this by repeatedly presenting the CS alone.

In the shower example, if prank-minded friends had repeatedly shouted, "Flush!" but the word was never followed by a hot-water dousing, the CR to the word would eventually have weakened and died. This is because each prank "Flush!" alarm would weaken the association between *flush* and hot water. When a CR has completely disappeared, we can say that it has been *extinguished*.

Figure 14.2 illustrates the processes of acquisition and extinction.

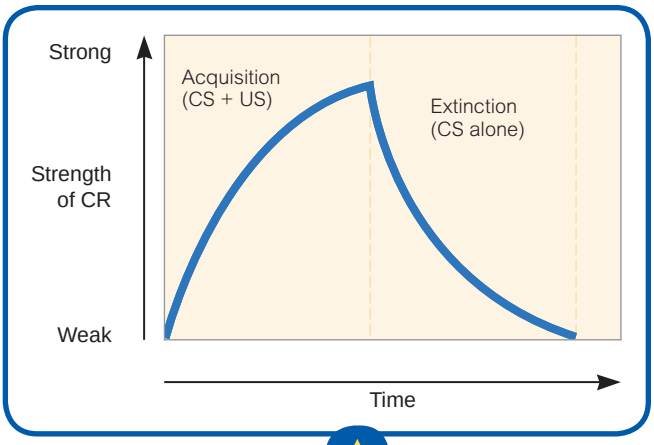


Figure 14.2
Two Basic Classical Conditioning Processes

Acquisition occurs as the CS and the US are repeatedly paired. Extinction happens if the CS alone is presented over a period of time.

PAUSE NOW OR MOVE ON

Turn to page 264 to review and apply what you've learned.

Ivan Pavlov's Discovery

WHAT'S THE POINT?

14-4 How did Ivan Pavlov discover classical conditioning?

One of the most famous names in the history of psychology is **Ivan Pavlov.** Pavlov, a Russian physiologist, earned a Nobel Prize for his studies of digestion in 1904. As happens to many good scientists, however, some unexpected findings sparked his curiosity and led him in new directions. He landed squarely in the realm of behavioral psychology.

At the time, Pavlov was investigating the effects of salivation (drool) on the digestive process. In a surgical procedure of his own design, he inserted a small tube to divert and collect salivary secretions from dogs (see **Figure 14.3**).

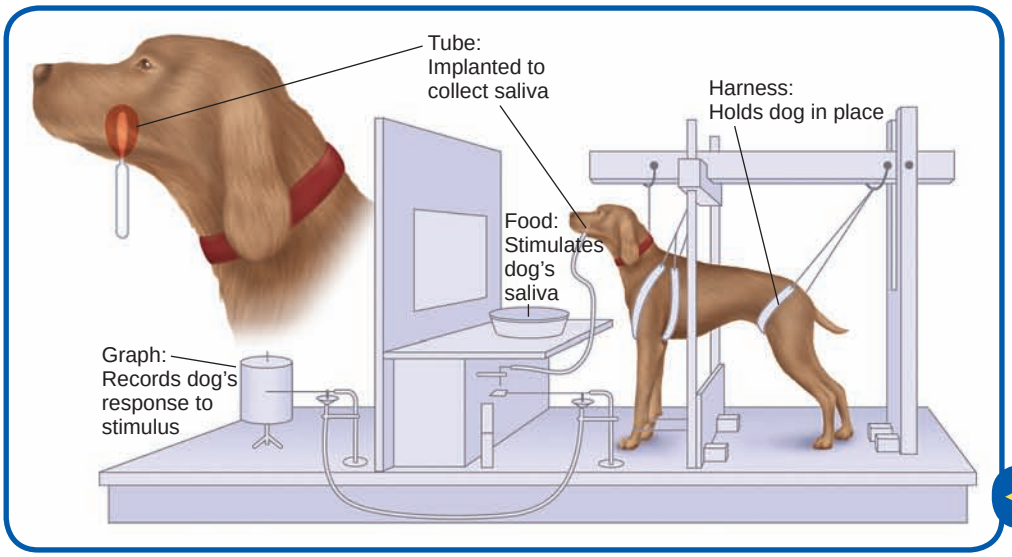
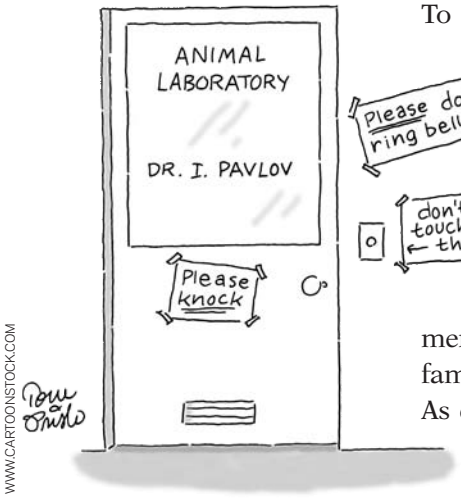

Tube: Implanted to collect saliva
Harness: Holds dog in place
Food: Stimulates dog's saliva
Graph: Records dog's response to stimulus

Figure 14.3
Pavlov's Method of Collecting Saliva

Pavlov performed surgery to divert the saliva to a collection tube. (Adapted from Goodwin, 1991.)



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To stimulate the production of saliva, he then introduced meat into the dogs' mouths.

When Pavlov first began working with a dog, the procedure was just fine. Pavlov would restrain the animal in a harness and stimulate the production of saliva with the meat. But after Pavlov had worked with a dog for a while, problems began to crop up. The more familiar the dog became with the procedure, the less likely it was to wait for the food before salivating. Some dogs began to drool as they were being harnessed. Some even salivated when they heard the experimenter come toward the kennel around the same time each day. If you have a family dog, you may have noticed this type of learning by association yourself. As dinnertime draws near, does your dog begin to salivate in anticipation as you start to prepare the food? If so, you may find this behavior funny or interesting, but the premature drooling was disruptive for Pavlov.

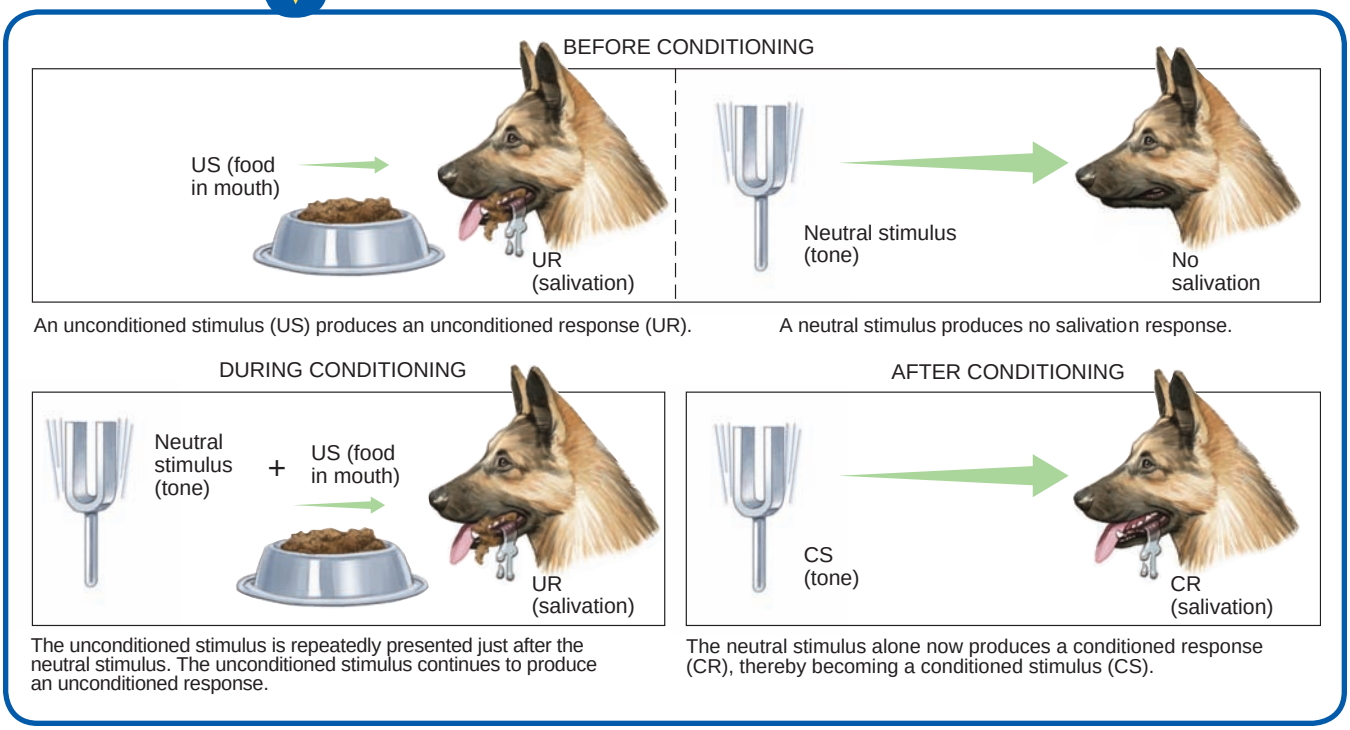
Intrigued with his dogs' "misbehavior," Pavlov began to wonder if he could control the salivation response by manipulating other stimuli in the environment. Would it be possible to choose a stimulus, such as the sound of a tuning fork, and intentionally create a salivation response to that stimulus? As Pavlov began to investigate these new questions about the dogs' behavior, he identified the central features of classical conditioning.

Let's use Pavlov's basic demonstration of classical conditioning to review the concepts we have already discussed. His task was to teach a dog to salivate to the sound of a tuning fork. Think about the *components* of this experiment, and try to identify the neutral stimulus, US, UR, CS, and CR. Then check your ideas by reading the summaries below and looking closely at **Figure 14.4.**

- The *unconditioned stimulus* (US) is the meat because it produces a salivation response without prior learning.

Figure 14.4
Pavlov's Experiment

Pavlov demonstrated the processes of classical conditioning by using meat to train a dog to salivate to the sound of a tuning fork.


BEFORE CONDITIONING
US (food in mouth)
UR (salivation)
Neutral stimulus (tone)
No salivation
An unconditioned stimulus (US) produces an unconditioned response (UR).
A neutral stimulus produces no salivation response.
DURING CONDITIONING
Neutral stimulus (tone)
+
US (food in mouth)
UR (salivation)
AFTER CONDITIONING
CS (tone)
CR (salivation)
The unconditioned stimulus is repeatedly presented just after the neutral stimulus. The unconditioned stimulus continues to produce an unconditioned response.
The neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

- The *unconditioned response* (UR) is salivation because salivation is the response to the US of meat. Notice that no learning has taken place yet. The ability of meat to make a hungry dog drool is reflexive, not learned.
- The neutral stimulus is the sound of the tuning fork before the dog has been conditioned. This stimulus is neutral because it does not produce a salivation response. Pavlov, of course, could have used many other stimuli—bells, whistles, or even lights or touches—as the neutral stimulus.
- The *conditioned stimulus* (CS) is the sound of the tuning fork after the dog has been conditioned because that tone now produces the response of salivation. Notice that the tone serves as both the neutral stimulus and the CS at different times in the conditioning process.
- The *conditioned response* (CR) is salivation because salivation is now the response to the sound of the tuning fork. Notice that salivation can be either the UR or the CR, depending on what stimulus led to the salivation.

MIKE AGLIOLO/SUPERSTOCK

Did You Flinch?

If so, you've been classically conditioned! Try to identify the US, UR, CS, and CR for this example of conditioning. Check your answers by turning the page.

Now let's look at the processes in this classical conditioning experiment. To produce *acquisition,* Pavlov repeatedly sounded the tuning fork just before introducing meat into the dog's mouth. He knew acquisition had occurred because he tested for a learned response: He presented the sound of the tuning fork without the meat. If the dog salivated (and it did), the salivation was a CR, proving that the sound of the tuning fork had become a CS. To extinguish the classically conditioned response, Pavlov repeatedly sounded the tuning fork without the meat. The learned association between the sound of the tuning fork and the taste of meat gradually weakened under these circumstances, and as the link weakened, the dog produced less and less saliva. When the salivation response had disappeared, *extinction* had occurred.

PAUSE NOW OR MOVE ON

Turn to page 264 to review and apply what you've learned.

Generalization and Discrimination

WHAT'S THE POINT?

14-5 What are generalization and discrimination?

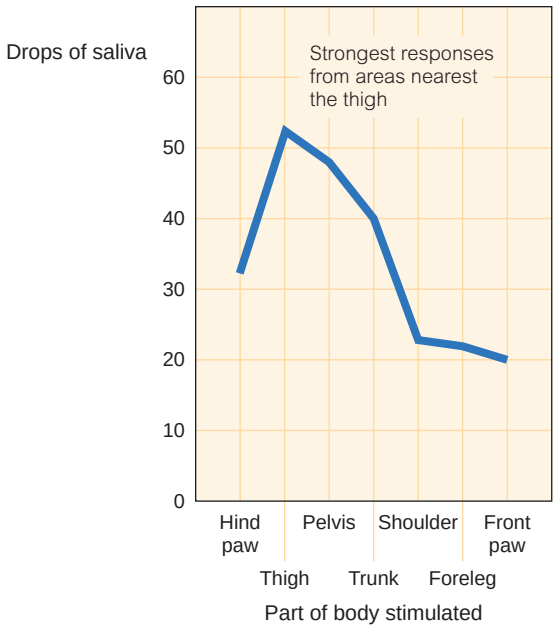
Now that we've reviewed the components and processes of classical conditioning, we will look next at two concepts that broaden our understanding of how we learn—generalization and discrimination.

Generalization occurs when an organism produces the same response to two similar stimuli. Assume for a moment that Pavlov somehow lost the tuning

generalization Producing the same response to two similar stimuli.

Figure 14.5
Generalization

Pavlov conditioned dogs to salivate when their thighs were stimulated by a slight vibration. This graph shows how much saliva was produced when other parts of the dogs' bodies were stimulated. The dogs salivated more when the stimulated spot was nearer to the point of original conditioning. If chemicals look too similar to food and drink packaging, a child may generalize and ingest dangerous products.



IMAGEBROKER/ALAMY

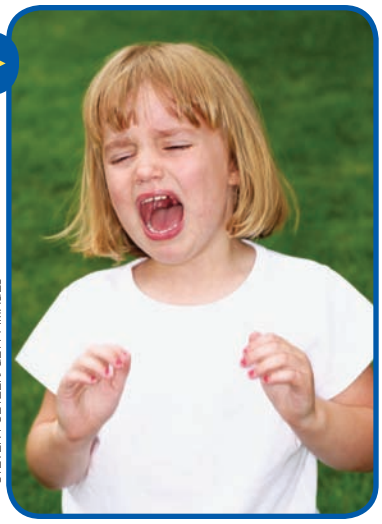
discrimination The ability to distinguish between two signals or stimuli and produce different responses.

fork he had used with one of his dogs and was forced to substitute a different tuning fork, one with a different tone. Let's also assume that Pavlov had progressed far enough so that the tone of the original tuning fork had become a CS that generated a strong CR of salivation. What do you think would happen when Pavlov sounded the substitute tuning fork, producing a tone that had never been paired with meat? Pavlov discovered that the dog did respond by salivating and that the more similar the substitute tone was to the original tone, the stronger the salivation response was. **Figure 14.5** illustrates some generalization data Pavlov collected using touches to various body parts as stimuli.

Discrimination occurs when an organism produces different responses to two stimuli. Continuing with the example in the last paragraph, what would happen if Pavlov found his missing tuning fork and now had two (the original and the substitute)? Thanks to generalization, both would be capable of producing salivation. Finally, what would happen if he paired the original tuning fork with the US of meat on some trials but never paired the substitute tuning fork with the US? Assuming the dog could actually hear the difference between the tones made by the two tuning forks, the conditioned salivation response to the sound of the original tuning fork would be maintained (because this tone tells the dog that food is on the way), but the response to the sound of the substitute tuning fork would be extinguished (because that tone never leads to meat). Now the dog is no longer generalizing (from one tone to a similar tone). Instead, the dog is discriminating (between the two tones).

Generalizing and Discriminating

A little girl who fears all buzzing insects is generalizing. If she fears bees but not flies, she is discriminating.


STEVEN PUETZER/GETTY IMAGES

Generalization and discrimination appear often in the world around us. For example, I know of

a little girl named Antonia who developed a classically conditioned fear of buzzing insects after a painful bee sting on the ear. The sting paired pain—a US that naturally produces fear—with the buzzing bee. Through this learned association, the buzzing bee became a CS for the CR of fear. This fear then generalized to all buzzing insects, and for a while Antonia feared everything that buzzed. With additional real-life experience, however, Antonia soon began to make appropriate discriminations. Her CR of fear stayed strong for buzzing things that give painful stings (like bees and hornets), but it was extinguished for buzzing things that don't give these stings (like disgusting flies or merely annoying mosquitoes).

Antonia's example involves classical conditioning, but generalization and discrimination can occur for other types of learning as well. I was fascinated when my son Eric was learning animals and their names as a 1-year-old. He used the word *bow-wow* to describe all dogs (a generalization), but he could also discriminate between dogs and other animals, like *meow-meows* and *moo-moos*.

PAUSE NOW OR MOVE ON

Turn to page 264 to review and apply what you've learned.

● Answers to the "Did You Flinch?" questions on page 255: The US is the explosion of the popped balloon. The UR is the flinch produced by the pop. The CS is the sight of the pin approaching the balloon. The CR is the flinch produced by the sight of the pin approaching the balloon.

John Watson and the Classical Conditioning of Emotions

WHAT'S THE POINT?

14-6 What is behaviorism, and how did John Watson and Rosalie Rayner use the principles of classical conditioning to create a learned fear in Little Albert?

The beauty of classical conditioning is not that it explains all, or even most, things but rather that it explains some things really well. Psychologists like Pavlov could predict and control classically conditioned responses with great accuracy.

Therefore, classical conditioning was a core topic of introductory psychology textbooks early in the twentieth century. This type of learning relied on **behaviorism,** the view that psychology must restrict its efforts to studying observable behaviors, not mental processes. This school of psychology was led by American psychologist **John B. Watson,** who believed you could control a learner's behavioral response by manipulating a stimulus in the environment. There was no need to consider what happened inside the learner's head. Indeed, we know that a dog has learned to sit if he does it, that a musician has learned a new piece when she can play it, that a gymnast has learned a new routine when he can perform it, that a child has learned to walk when she can make it across the room on two legs, and that a student has learned

JOHN B. WATSON (1878–1958) Founder of behaviorism, the theory that psychology should restrict its efforts to studying observable behaviors, not mental processes.

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behaviorism The theory that psychology should only study observable behaviors, not mental processes.

psychology when he can do well on a test. In all these cases, learning is reflected in behavior.

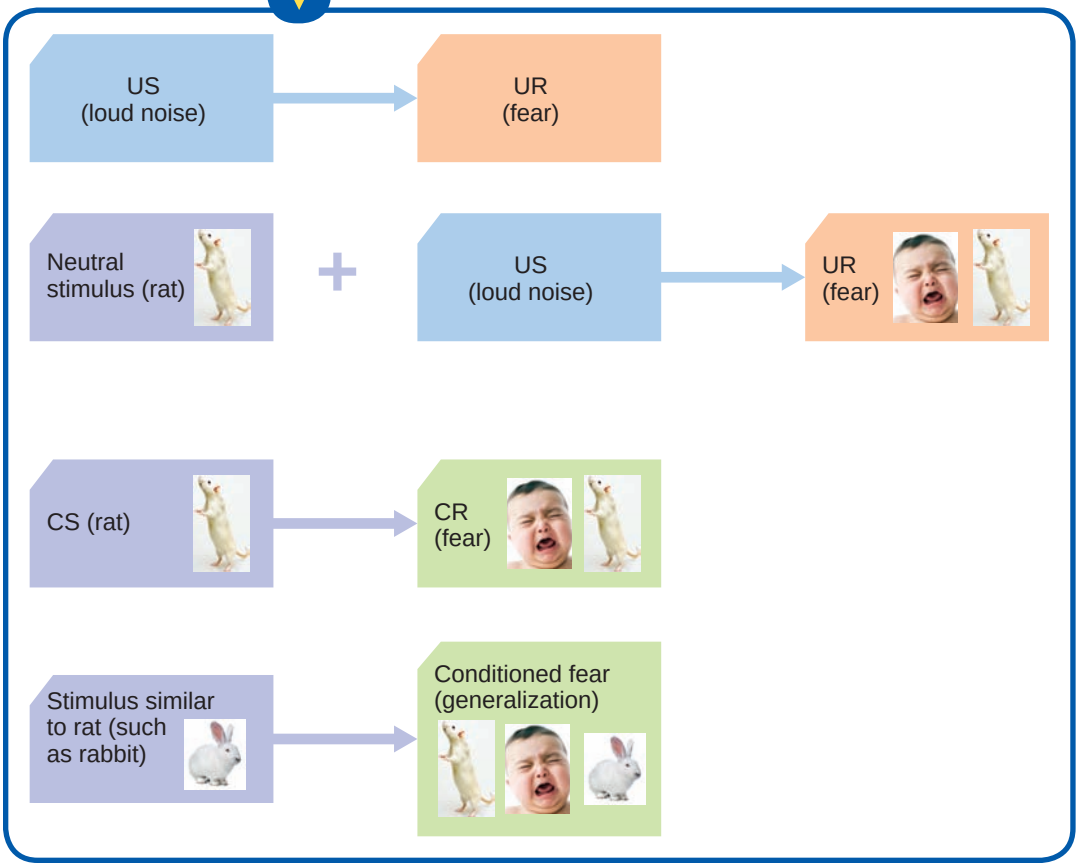
With his passionate belief that psychology should study only stimulus-response relationships, Watson was not pleased with the growing acceptance of Freud's psychodynamic viewpoint, which relied heavily on the unconscious mind as a means to explain human behavior. Freudian psychoanalysts, for example, viewed phobias (disruptive, irrational fears) as a symbolic result of unconscious fears left over from childhood.

Watson, working with Rosalie Rayner at Johns Hopkins University in 1920, set out to demonstrate that such phobias could be explained by the principles of classical conditioning. In one of the most famous demonstrations in the history of American psychology, he intentionally established a fear of rats in an 11-month-old boy who became known as Little Albert. Initially, Albert was not afraid of the tame, white laboratory rat. (In the world of classical conditioning, the rat was a neutral stimulus.) Albert did not respond to rats with crying or any facial expressions signifying fear. Watson and Rayner were able to change this quite easily by sneaking up behind Albert when he was in the presence of the rat and banging a steel bar to make a startling noise. The noise was a US that produced a UR of fear (crying). Because the US was paired with the rat, the rat became a CS to produce the same fear response (see **Figure 14.6**).

Watson and Rayner demonstrated that Little Albert's fear was a predictable outcome of an environmental condition and, in this case at least, did not represent a repressed, unconscious conflict.

Figure 14.6
Conditioning Little Albert

By pairing the neutral stimulus of a white rat with the US of a loud noise, John Watson and Rosalie Rayner were easily able to classically condition fear. They also demonstrated generalization when Little Albert became afraid of other white, furry animals.



BABY: JOSE LUIS PELAEZ INC/GETTY IMAGES; RABBIT: ERIK LAM/SHUTTERSTOCK; RAT: MASLOV DMITRY/SHUTTERSTOCK

They also demonstrated generalization (Albert also showed fear of a furry, white rabbit) and discrimination (he did not show fear of dissimilar toys). Albert's mother apparently began to have some doubts about the research and withdrew the boy before Watson and Rayner were able to extinguish Albert's newly established phobia. (For more on Little Albert, see Thinking Like a Psychological Scientist: What Ever Happened to Little Albert?)

Thinking Like a PSYCHOLOGICAL SCIENTIST

What Ever Happened to Little Albert?

Recent research by Hall Beck and Sharman Levinson (Beck et al., 2009) has shed new light on one of the longstanding mysteries of American psychology—what ever happened to Little Albert, the 11-month-old boy in Watson and Rayner's experiments? In establishing how widespread curiosity about Little Albert has been, Hall and Levinson even cite the last edition of this book, where we speculated that Little Albert might still be alive, an old man with a lingering fear of rats. We are used to thinking of experimental research done in the here and now, but research techniques can also be used to deepen our understanding of the history of psychology.

Beck and Levinson approached the Little Albert mystery by gathering information from a wide variety of sources. They looked for clues about the identity of Little Albert in Watson and Rayner's published articles, expense reports, letters, and film they made of their research. They also scoured journals to learn what had been uncovered by others interested in the puzzle. In order to better understand a date discrepancy, they surveyed librarians to verify when the journal publishing the Little Albert study was actually received. They hoped to find evidence of Albert by examining the patient records of the hospital home at Johns Hopkins University, where they knew he lived, but the records had all been destroyed. Instead they sought out data from the 1920 national census and state birth certificates, learning in the process that Albert's mother had provided the false name of a husband because the child was born out of wedlock.

All this digging led the researchers to believe that Albert was really Douglas Merritte, the child of Arvilla Irons, born on March 9, 1919. From this they used the Internet to locate Gary Irons, Douglas's half brother. He was able to provide confirming evidence in the form of a photograph of young Douglas found when Gary was visiting relatives as a child.

So, what did happen to "Albert"? Sadly, 6-year-old Douglas Merritte died in 1925 of a brain disorder called hydrocephalus. (His mother lived until 1988.) Beck and Levinson found no evidence that he suffered any negative effects from Watson and Rayner's research. In addition to solving a longstanding mystery, Beck and Levinson filled in some missing pieces about confidentiality and other ethical concerns back in the 1920s. Today's ethical guidelines for human research (see Module 2) are the most current version of standards whose origins stretch back to the early years of psychological science.

American Behaviorism

John Watson and Rosalie Rayner set out to prove that all behavior was the result of environmental factors by classically conditioning a fear of rats and other small, furry animals in an 11-month-old boy known as Little Albert.

COURTESY OF PROFESSOR BENJAMIN HARRIS, UNIVERSITY OF WISCONSIN–PARKSIDE

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Classically Conditioned Emotion

Apple spends advertising dollars to associate its products, like the iPod, with a particular emotional response. If you have an iPod, you must be cool!

What can we conclude from Watson and Rayner's research? The main point is that whenever you associate an emotional response with a particular stimulus, classical conditioning is probably involved. Advertisers learned this point quickly and have used it to their advantage for years. Nestea commercials, for example, repeatedly pair images of cool, refreshing swimming pools and Nestea instant iced tea. The images of the pools function as a US to produce in viewers a feeling of being cool and refreshed. After being repeatedly paired with these images, the product name becomes a CS. Alone, it, too, produces a CR of being cool and refreshed. Thus, when I walk in the grocery store and see a dozen brands of instant iced tea mix, I am more likely to select Nestea because just looking at that label makes me feel cool and refreshed.

Advertisers spend millions of dollars to create classically conditioned emotional desire, often for products of questionable value. Marlboro ads establish a rugged, macho image. Mountain Dew ads establish a youthful image. Victoria's Secret ads establish a sexy image. All are attempts to use the principles of classical conditioning to sell more products.

You don't need a big advertising budget to find other examples of classically conditioned emotions. Say you are seeing a new person and things are going delightfully well. The budding relationship is a US for positive emotions. During the evening, you hear a new song on the radio. What happens? The song becomes "your song." Whenever you hear it, you feel better because it produces the same positive emotions that the relationship itself does. The song has become a CS, and classical conditioning is at work. A similar thing happens to me with running shoes. For me, running functions as a US for relaxation and stress relief. The more miles I put on a new pair of shoes, the more comforting they become. Eventually, all I have to do is put on the shoes (now a CS) to start feeling better. Maybe this is one reason I generally prefer my old, broken-in clothes to brand new ones. The old jeans are associated with a wealth of pleasant memories that bring me comfort as reliably as the tone of Pavlov's tuning fork made a dog drool.

Classically Conditioned Comfort

Because of the many pleasant events that may be associated with wearing them, old clothes and shoes often become conditioned stimuli that produce a relaxed, comforting response. New clothes may be stylish, but they don't have this ability to help us unwind.

RON CHAPPLE/THINKSTOCK/PICTUREQUEST

Negative emotions can be conditioned, too. Some women who have been raped destroy the clothes they were wearing at the time of the attack. The act of rape is an extraordinarily powerful US for negative feelings—powerful enough to produce conditioning with a single pairing. The clothes, because they were associated with the crime, become a CS that elicits the same feelings. Even buildings can take on emotional baggage. Watch the facial expressions of students walking into your high school in the morning. Those who find school to be a generally pleasant experience will brighten up as soon as they walk through the door. Because it's a place associated with good things happening, the building itself can produce positive feelings. Unfortunately, the school building will have the opposite effect on other students. Their associations are mostly negative, and the building will be a CS for negative emotions. Similarly, places

of worship, favorite restaurants, hospitals, and sites of automobile accidents can all trigger emotions—some positive, some negative, but all classically conditioned.

cognition All mental processes associated with thinking, knowing, and remembering.

PAUSE NOW OR MOVE ON

Turn to page 264 to review and apply what you've learned.

Cognition and Biological Predispositions

WHAT'S THE POINT?

14-7 Why are the roles of cognition and biological predispositions important in learning?

Watson was influential in his day, but behaviorism no longer dominates psychology. A growing body of evidence indicates that all kinds of learning, including classical conditioning, can be understood only in light of **cognition**—mental processes like thinking and memory. To most of us, this is simply common sense. If you ask a group of friends to define *learning,* they will almost surely tell you that it is something that occurs in your head. "Learning is when you understand something" and "learning occurs when you remember" are typical answers, and they both reflect the importance of cognition. Behaviorists like Watson were suspicious of using such explanations because they thought it was impossible to study cognitive processes in a truly scientific way. In contrast, contemporary psychologists believe it is impossible to understand classical conditioning without reference to cognitive processes.

Cognition and Classical Conditioning

For several decades before the 1980s, original research in classical conditioning had largely come to a halt. From Pavlov on, a growing body of evidence seemed to support the idea that classical conditioning was purely behavioral and required only that a neutral stimulus be repeatedly paired with an unconditioned stimulus. This way of thinking became so well established that hardly anybody bothered to question it anymore. But **Robert Rescorla** and Allan Wagner began to think outside the box. They realized that certain aspects of classical conditioning situations simply could not be explained without reference to *cognition*—the dreaded mental processes the behaviorists were trying to avoid.

Rescorla and Wagner (1972) conducted clever experiments showing that a simple pairing of stimuli is not enough to ensure classical conditioning. The key feature appears to be predictability. If a formerly neutral stimulus ("Flush!") allows the learner to reliably predict that a US (hot water) is about to occur, the neutral stimulus will morph into a CS. If the US is not

ROBERT RESCORLA (1940–) Developed, along with colleague Allan Wagner, a theory that emphasized the importance of cognitive processes in classical conditioning.

COURTESY OF ROBERT RESCORLA

predictable, the neutral stimulus will stay neutral. If Pavlov's tuning fork tone had sometimes been followed by meat and sometimes not, it would not have become a CS, and the CR of drooling would not have developed. The tone would not have *reliably predicted* the US (meat). Calculating whether an event is predictable is, of course, a cognitive process, a mental assessment that requires thinking.

Taste Aversion and the Role of Biology

The biological perspective has influenced our understanding of another aspect of classical conditioning. In 1966, John Garcia and Robert Koelling showed how classically conditioned taste aversion—an avoidance of certain tastes—could develop. While doing radiation research on rats, Garcia and Koelling noticed that the rats began to avoid drinking from the water bottles in the radiation chambers. Like Pavlov, these researchers became intrigued by this unexpected result of their research. In new trials, they discovered that it was possible to use a nausea-producing drug as a US to condition an aversion response to a particular taste. Paired with the drug that produced nausea, a particular food or drink became a CS that also produced the feelings of nausea.

Originally, psychologists thought the principles of classical conditioning would operate with any stimulus, for any species. This is not the case. Garcia's work on taste aversion shows that we are biologically predisposed to develop an aversion to the taste of the food we ate before becoming sick rather than, for example, to the place where we ate the food. I once became ill one evening after eating cheddar cheese soup, which had been one of my favorite foods. Sure enough, I now have no desire to smell or taste this soup. Note that of all the stimuli that were present the evening I became sick, *only* the smell and taste of the soup produced an aversion. I was with my wife that evening, but I did not develop an aversion to her—thank goodness!

This biological predisposition to develop taste aversions may protect us from revisiting foods that could be poisonous and may be part of our evolutionary heritage.

John Garcia

Raised in poverty, Garcia was unable to attend school regularly as a child. He was in his late twenties before starting junior college, and he didn't receive his Ph.D. until he was almost 50. Despite these obstacles, Garcia was elected to the National Academy of Sciences and received the American Psychological Association's Distinguished Scientific Contribution Award for his work in conditioning.

Classically Conditioned Taste Aversion

Have you ever become sick after eating seafood? If so, you probably learned to avoid similar foods in the future. Why are taste aversions likely to develop?

DEAN CONGER/CORBIS

People who easily developed taste aversions were more likely to survive and have offspring. Those who snacked repeatedly on tainted food were less likely to live to reproduce. Other common fears—heights, thunderstorms, or snakes—may offer similar protection against threats that have existed since the beginning of human history (Cook et al., 1986). Perhaps unfortunately, we are less likely to fear modern, technological threats, like automobiles and unseen pollutants in the water supply. These significant threats to our well-being have not been around long enough to become part of the evolutionary "baggage" we will pass on to future generations.

PAUSE NOW OR MOVE ON

Turn to page 265 to review and apply what you've learned.

Classical conditioning remains an important aspect of modern psychology. Research has moved us from a purely behavioral explanation of this type of learning to one that is more heavily influenced by cognitive and biological factors. Even so, classically conditioned behaviors and emotions are an important part of the world around us.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 14

Thinking About Classical Conditioning

Experiencing Classical Conditioning

WHAT'S THE POINT?

14-1 What is classical conditioning?

- Classical conditioning is a type of learning by association. This means that two stimuli appear together in such a consistent and reliable way that one stimulus gains the power to predict the response that the other stimulus already produces.

Apply What You Know

1. Learning is identified by a relatively permanent change in _____.
2. Which of the following is an example of classical conditioning?
   a. A dog learns to flinch when it sees lightning because lightning is usually followed by loud thunder.
   b. A cat learns to take the same path through the garden each day because it has found mice there before.
   c. A parrot learns to say, "Hello," after hearing its owner repeat the word hundreds of times.
   d. A child practices her multiplication tables until she can do them perfectly.

Components of Classical Conditioning

WHAT'S THE POINT?

14-2 How are the four main components of classical conditioning defined?

- In a classically conditioned response, the unconditioned stimulus (US) triggers the unconditioned response (UR) automatically. The previously neutral conditioned stimulus (CS) is repeatedly paired with the UR, and eventually the CS triggers the conditioned response (CR).

Apply What You Know

3. James blinks when air is puffed through a straw toward his eye. In this case, the air puff is a(n) _____ and the blink is a(n) _____.
4. Jamie blinks when she hears the sound of a tuning fork. In this case, the sound of the tuning fork is a(n) _____ and the blink is a(n) _____.

Classical Conditioning Processes

WHAT'S THE POINT?

14-3 What are the two basic processes in classical conditioning?

- The two basic processes in classical conditioning are (1) acquisition, developing a new, learned response; and (2) extinction, the diminishing of a learned response.

Apply What You Know

5. How could you use a mild electric shock to classically condition a rat to flex its forepaw when a tone is sounded?
6. Extinction occurs when you present the _____ by itself repeatedly.

   a. CS
   b. UR
   c. US
   d. CR

Ivan Pavlov's Discovery

WHAT'S THE POINT?

14-4 How did Ivan Pavlov discover classical conditioning?

- Pavlov discovered the basic principles of classical conditioning during his research on the digestive process. He found that he could classically condition dogs to salivate (CR) to the sound of a tuning fork (CS) by pairing the tuning fork with meat (US), a stimulus that produced salivation automatically (UR).

Apply What You Know

7. In what sense did Pavlov's dogs "misbehave"?
8. Pavlov used _____ for a US and a _____ for a CS.

Generalization and Discrimination

WHAT'S THE POINT?

14-5 What are generalization and discrimination?

- Generalization is a process in which we make the same response (a high five, for example) to two similar stimuli (a touchdown in football and a volleyball kill). Discrimination is a process in which we make different responses to two stimuli (high five for winning a state championship, tears for losing).

Apply What You Know

9. Which of the following is an example of generalization?

   a. A dog responds to a stroke on its left side the same way it responds to a stroke on its right side.
   b. A dog both salivates and wags its tail when provided with meat.
   c. A dog barks when a researcher enters the laboratory.
   d. A dog learns to stop salivating to the sound of a tuning fork.

10. Provide an example of discrimination.

John Watson and the Classical Conditioning of Emotions

WHAT'S THE POINT?

14-6 What is behaviorism, and how did John Watson and Rosalie Rayner use the principles of classical conditioning to create a learned fear in Little Albert?

- Watson established the perspective of behaviorism, the view that psychology should restrict its efforts to studying observable behaviors, not mental processes.
- Watson and Rayner extended the study of classical conditioning to emotional responses. In an ethically troubling set of experiments, they conditioned a child, Little Albert, to fear white rats by applying the principles of classical conditioning. Watson and Rayner demonstrated that whenever you associate an emotional response with a particular stimulus, classical conditioning is probably involved.

Apply What You Know

11. In Watson's research with Little Albert, which of the following functioned initially as an unconditioned stimulus for fear?

    a. a loud noise
    b. a white rat
    c. crying
    d. Rosalie Rayner

12. Why did Watson want to use behaviorism to explain phobias?

Cognition and Biological Predispositions

WHAT'S THE POINT?

14-7 Why are the roles of cognition and biological predispositions important in learning?

- Researchers have demonstrated that even learning acquired through classical conditioning is affected by our thought processes.
- Robert Rescorla and Allan Wagner demonstrated that a learned association will not develop unless the CS predicts the US. This recognition is a mental process (cognition).
- Biological predispositions—our inborn tendencies—make us less likely to do things (like playing with snakes and spiders) that might threaten our lives. John Garcia and Robert Koelling showed how classically conditioned taste aversion could develop quickly, demonstrating that some species are more likely to learn some responses than to learn others based on their biological predispositions.

Apply What You Know

13. Robert Rescorla believes cognition plays a key role in classical conditioning because

    a. a CS must have predictive value.
    b. emotions are always involved.
    c. Watson's experiments proved that cognition was necessary.
    d. very primitive species cannot learn.

14. John Garcia's work with _____ in rats indicates that classical conditioning is influenced by biology.

KEY TERMS AND KEY PEOPLE

learning, p. 250
classical conditioning, p. 250
stimulus, p. 250
response, p. 250
unconditioned stimulus (US), p. 251
unconditioned response (UR), p. 251
conditioned stimulus (CS), p. 251
conditioned response (CR), p. 251
acquisition, p. 252
extinction, p. 252
generalization, p. 255
discrimination, p. 256
behaviorism, p. 257
cognition, p. 261
Ivan Pavlov (1849–1936), p. 253
John B. Watson (1878–1958), p. 257
Robert Rescorla (1940–), p. 261

MODULE 15

Operant Conditioning

The Nature of Operant Conditioning

The Law of Effect

Reinforcement
- Immediate Versus Delayed Reinforcement
- Primary Versus Secondary Reinforcement

Punishment
- The Process of Punishment
- Problems With Punishment

Reinforcement Procedures
- Shaping
- Discrimination and Extinction

Schedules of Reinforcement
- Continuous Reinforcement
- Partial Reinforcement
- Fixed-Interval Schedule
- Variable-Interval Schedule
- Fixed-Ratio Schedule
- Variable-Ratio Schedule

New Understandings of Operant Conditioning
- The Role of Cognition
- The Role of Biology

What can you learn from a pigeon in a box? Plenty, as we shall see when we look at the work of B. F. Skinner and others who studied the principles of operant conditioning.

The Nature of Operant Conditioning

WHAT'S THE POINT?

15-1 What is operant conditioning?

A few years ago, I was in the grocery store on a busy, preholiday afternoon. In front of me in the checkout line was a mother and her preschool-age daughter. When the girl spotted the candy bar display, she asked if she could have one. Mom, clearly tired and running out of patience on a hectic day, said, "No." The girl, a bit cranky herself, started to fuss, and the battle was on. It quickly escalated to a full-fledged tantrum on the girl's part and yelling on the mom's. A short while later, the mother apparently decided the girl was not about to settle down while they waited to pay for their groceries. With an exasperated "Here, just take it and be quiet," she tossed a candy bar toward

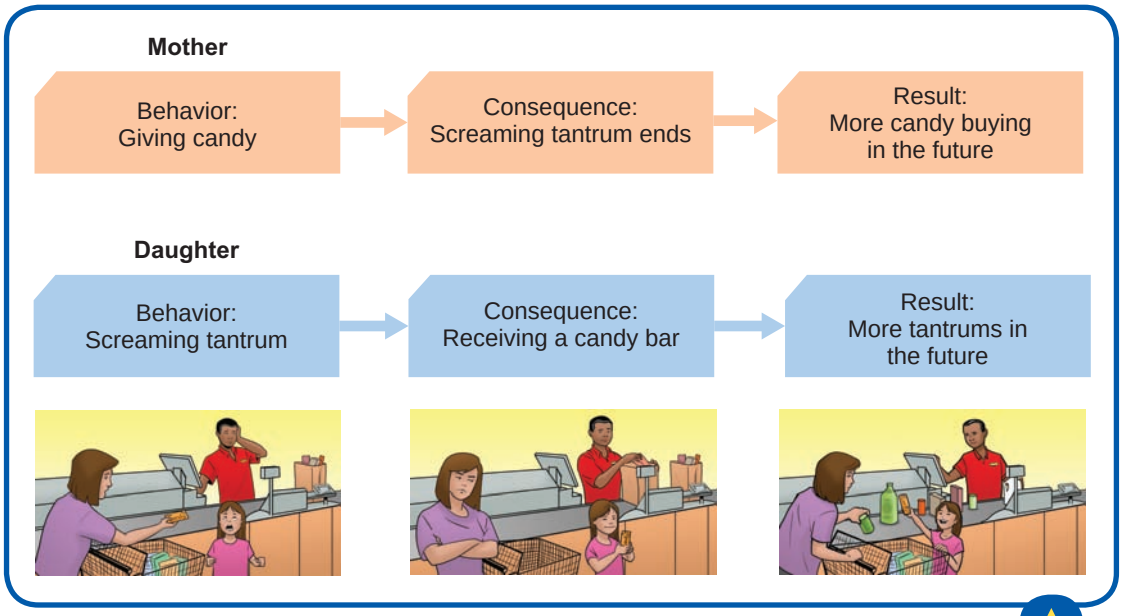


Figure 15.1
Operant Conditioning for Better or for Worse

This child doesn't know it, but she is using operant conditioning to train her mother to buy candy. Her mother is unwittingly operantly conditioning the child to have tantrums.

the girl, who instantly went from tantrum mode to a bright smile as she tore into the treat.

You may be thinking, "Aha! That little girl certainly had her mother trained." In fact, both the mother's and the daughter's behaviors were affected by **operant conditioning,** a type of learning in which the frequency of a behavior depends on the consequence that follows that behavior. In operant conditioning, how often a behavior occurs (its frequency) depends on the event that follows the behavior (its consequence). By giving her daughter the candy bar, the mother was inadvertently using operant conditioning to teach her daughter to throw tantrums. At the same time, by stopping her tantrum, the daughter was unknowingly using operant conditioning to teach her mother to buy her candy (see **Figure 15.1**). You decide who was the more effective psychologist!

Operant conditioning is straightforward in its most basic form. Suppose your parents handed you a $100 bill each evening if you cleared your own dinner dishes from the table after completing your meal. Would this consequence influence your dish-clearing behavior? Most likely, you would begin to clear your dishes more regularly and more quickly than before. What if your parents somehow wired the television so that you received a painful electric shock every time you touched the power button on the set or the remote control? The shock is a consequence, too. Would it influence how often you touched the power button?

Wouldn't it be great if we could influence others—parents, siblings, friends, teachers, employers—to behave the way we want them to? The pair in the grocery store stumbled upon a powerful behavior-changing tool. Let's take a closer look at how operant conditioning techniques work.

operant conditioning A type of learning in which the frequency of a behavior depends on the consequence that follows that behavior.

PAUSE NOW OR MOVE ON

Turn to page 286 to review and apply what you've learned.

THE GRANGER COLLECTION, NEW YORK

EDWARD THORNDIKE (1874–1949) Author of the law of effect, the principle that forms the basis of operant conditioning.

The Law of Effect

WHAT'S THE POINT?

15-2 What is the law of effect?

Operant conditioning developed from an idea of **Edward Thorndike,** an early American psychologist. Thorndike's idea was the *law of effect,* which simply states that behaviors with favorable consequences will occur more frequently and behaviors followed by unfavorable consequences will occur less frequently. Another American psychologist, **B. F. Skinner,** built his life's

Thinking Like a PSYCHOLOGICAL SCIENTIST

B. F. Skinner

Few have done more than B. F. Skinner to advance the notion of psychology as a scientific discipline. In one study, almost 2000 psychologists ranked Skinner as the most eminent psychologist of the twentieth century (Haggbloom et al., 2002). Through his research and his writing, Skinner spent his career developing a behavioral "technology" that did not rely on references to unseen thought processes. His goal was to understand and control the actions of other organisms. His new behavioral technology was operant conditioning.

Skinner believed that all behaviors in all species are governed by the same principles. To identify these principles, Skinner studied simple behaviors, mostly of rats and pigeons. He and his assistants taught rats to press a lever with their paws and pigeons to peck a disk with their beaks. The rats and pigeons performed these acts in an invention that Skinner called an *operant chamber* but that most others call a *Skinner box.* The Skinner box gives the experimenter an opportunity to control the environment and precisely record an animal's responses. Using this arrangement, Skinner identified principles of operant conditioning that he felt could be used to understand and control complicated behaviors in the real world.

Skinner, never content to limit himself to the laboratory, became a ceaseless advocate for his point of view. He was often the center of controversy because of many books and articles written by and about him. Skinner's public fame started when in a magazine article (Skinner, 1945), he detailed how he and his wife were using a climate-controlled "air crib" for their daughter (which some felt was too similar to a rat's or pigeon's operant chamber).

EVERETT COLLECTION INC/ALAMY

B. F. Skinner's Influence in the Laboratory

This pigeon in a Skinner box, or operant chamber, has been taught to peck a key for food reinforcement.

Skinner stayed in the public eye for the rest of his career. In the late 1940s, he published *Walden Two,* a novel presenting his ideas for a perfect community based on principles of operant conditioning. In the book, Skinner criticized democracy, the nuclear

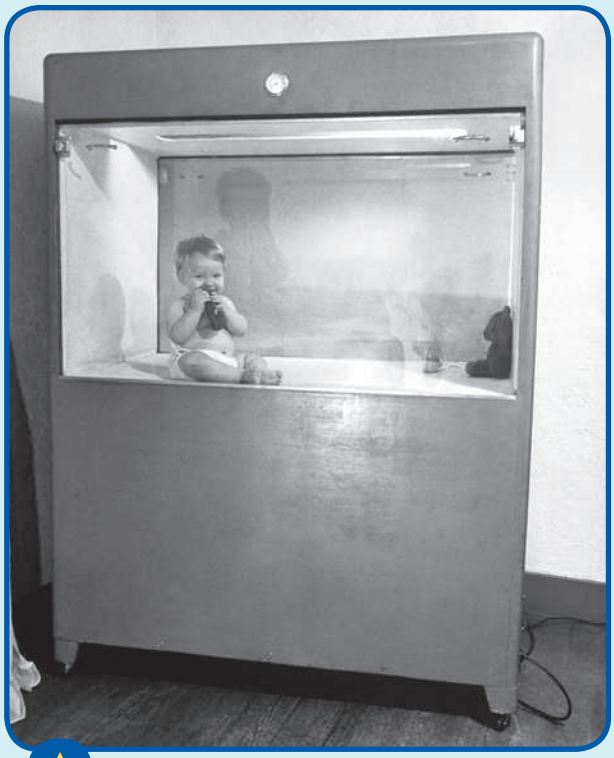
work on this idea, developing the fundamental principles and techniques of operant conditioning (see Thinking Like a Psychological Scientist: B. F. Skinner). Two of the more important concepts used in operant conditioning are reinforcement and punishment.

- **Reinforcement** is any consequence that *increases* the future likelihood of a behavior.
- **Punishment** is any consequence that *decreases* the future likelihood of a behavior.

Keep in mind that the learner, not the teacher, casts the vote that determines whether a consequence will be a reinforcement or a punishment. When my two children were younger, they had different feelings about broccoli. Carl

B. F. SKINNER (1904–1990) Behavioral psychologist who developed the fundamental principles and techniques of operant conditioning and devised ways to apply them in the real world.

BACHRACH/GETTY IMAGES



BERNARD HOFFMAN/TIMEPIX

The "Baby in a Box"

B. F. Skinner's daughter spent time in this specially designed environment. Some thought this was awful; others thought it was less of a problem than a standard baby crib with bars.

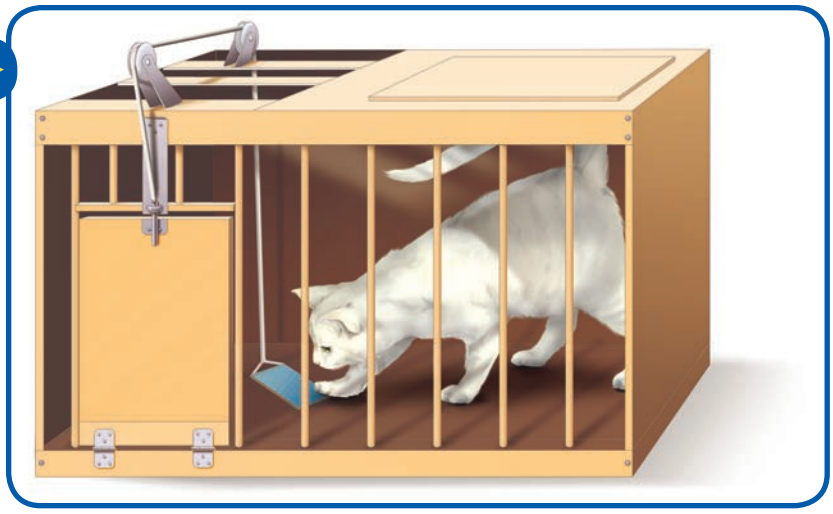
family, the use of money, and religion. Nevertheless, he inspired a number of groups to start communities that avoided punishment and used reinforcement to encourage desirable behaviors. Some are still in existence, and I once had a class write Skinner to learn what he thought of them. He replied that his principles were applied most appropriately at Los Horcones in Sonora, Mexico (Skinner, 1988). In 1971, Skinner published *Beyond Freedom and Dignity,* describing his belief that human freedom was an illusion. This sparked enough public discussion to land him on the covers of national news magazines.

Skinner loved the debate and was passionate about defending his positions and the science on which they were based. His final speech, delivered at the American Psychological Association convention only eight days before he died of leukemia in 1990, was a spirited defense of behaviorism and critique of cognitive "science," which he believed wasn't scientific at all (Skinner, 1990).

Skinner's viewpoints were extreme, but his work does have a number of successful, practical applications. As you will see throughout this module, operant conditioning principles affect our behavior at home, in school, in the world of sports, and at work (Flora, 2004). Skinner may not have always won people's hearts and minds, but he did contribute importantly to our understanding of learned behavior and the development of psychology as a science.

Thorndike's Puzzle Box

Thorndike constructed puzzle boxes such as this one to study how cats learned to escape. At first, a cat's ability to find the lever that had to be pressed to open the door depended on trial and error, but later the animal had a tendency to repeat the behaviors that had been successful before. This research led to the development of the law of effect.



reinforcement Any consequence that increases the future likelihood of a behavior.

punishment Any consequence that decreases the future likelihood of a behavior.

really liked broccoli, and if I had given him some after he took out the garbage, he would have been more likely to take out the garbage in the future. For him, broccoli was a *reinforcement*. But Eric did *not* like broccoli. If I had given Eric broccoli after he took out the garbage, he probably would never have done that chore again. Broccoli was a *punishment* for Eric. My feelings about broccoli (which I like, especially with cheese sauce) make no difference.

Parents and other authority figures don't always understand this aspect of consequences. A parent will sometimes yell at a child for misbehavior, thinking that yelling is a form of punishment. However, a child who is usually ignored may actually crave being yelled at because it's about the only parental attention the child gets. In this case, the law of effect predicts the behavior that preceded the parent's yelling will be *more* likely to happen again.

Reinforcement and the Law of Effect

Fishing crews in the Cayman Islands have cleaned their catch in this bay for years, thus providing an easy meal for the stingrays that live in the surrounding waters. The rays began to hang around, and then divers and swimmers began feeding them by hand and even petting them. Can you see how the law of effect has been at work in this situation?

CHARLOTTE VAN OYEN WITVLIET

HI AND LOIS

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Who Teaches Whom?

What behavior has been reinforced?

Likewise, a school administrator might suspend a student for skipping class, not realizing that for a student who doesn't care for school this punishment is not a punishment at all: It may even make future skipping more likely!

PAUSE NOW OR MOVE ON

Turn to page 286 to review and apply what you've learned.

Reinforcement

WHAT'S THE POINT?

15-3 What are the different kinds of reinforcement?

Reinforcement procedures strengthen responses by making them more likely to occur again. There are two ways to reinforce a behavior: positive reinforcement and negative reinforcement (see **Figure 15.2**).

positive reinforcement In operant conditioning, anything that increases the likelihood of a behavior by following it with a desirable event or state.

Positive reinforcement is anything that increases the likelihood of a behavior by following it with a desirable event or state. For example, if a student earns an A in psychology and his mother pays him $10 for that, then she has positively reinforced his behavior.

POSITIVE REINFORCEMENT
Behavior is followed by a desirable event or state.

MARY KATE DENNY/PHOTO EDIT

$10 for an A makes it more likely a student will earn more As.

NEGATIVE REINFORCEMENT
Behavior ends an undesirable event or state.

MICHAL KOWALSKI/SHUTTERSTOCK

Taking aspirin relieves headaches and makes it more likely that aspirin will be taken in the future.

Figure 15.2
Reinforcement Strengthens Behavior

Positive and negative reinforcement work differently, but both types of reinforcement make a behavior more likely to happen again.

negative reinforcement In operant conditioning, anything that increases the likelihood of a behavior by following it with the removal of an undesirable event or state.

Negative reinforcement is anything that increases the likelihood of a behavior by following it with the removal of an undesirable event or state. Negative reinforcement is a tricky concept. Note that the behavior is a means of either escaping or avoiding an undesirable situation. The words *positive* and *negative* in this context do not mean "good" and "bad" but rather are used in a mathematical sense. Here, *positive* simply means that something desirable is *added*. And *negative* means that something undesirable is *subtracted*. For example, Roshni's headache is undesirable. If taking aspirin provides relief from the headache, Roshni's behavior of taking aspirin has been negatively reinforced. Negative reinforcement, like all reinforcement, *strengthens* a behavior. So, Roshni becomes more likely to take aspirin to escape a headache in the future.

The concept of negative reinforcement can be confusing at first. Sometimes students think it is simply a more technical term for punishment, but this is not the case. Punishment, as you will see soon, weakens a behavior. Negative reinforcement always strengthens a behavior that removes an undesirable stimulus. Here are two more examples of negative reinforcement:

1. The girl in the grocery store at the beginning of this module used negative reinforcement to teach her mom to buy her candy. The mother found the tantrum undesirable, and she escaped it by buying her daughter the candy she wanted. The end of the tantrum negatively reinforced the mother's candy-buying behavior, which is likely to happen again in the future.
2. Hitting the snooze button on my annoying alarm clock is negatively reinforcing because the behavior allows me to escape from the alarm. This strengthens the behavior and helps ensure that I will hit the snooze button in the future.

Immediate Versus Delayed Reinforcement

Which affects our learning more—immediate rewards or delayed rewards? If psychologists had designed the warning label on cigarette packs, it might say, "Warning: If you smoke these cigarettes, your breath will smell awful for the rest of the day!" Psychologists know that we are more likely to respond to immediate consequences (bad breath) than to delayed consequences (the long-term risk of lung or heart disease). In other words, *immediate reinforcement* is more effective than *delayed reinforcement*. This also helps explain why it is difficult to *quit* smoking cigarettes. The desirable consequence—the "rush" produced by the chemicals in tobacco—is immediate. The undesirable effects on the lungs and cardiovascular system are more long term. It's no surprise, then, that drugs that produce the most immediate reinforcement, like nicotine and cocaine, are the most addictive (Marlatt, 1991). You can see the same relationship in those who overeat. The taste of fattening foods provides immediate positive reinforcement, but the effects of obesity are delayed.

Rats and pigeons, like people, prefer immediate reinforcement, and they seem to require it for learning. A rat, for example, will not learn to press a bar if the reinforcement for that behavior is delayed by 30 seconds or more. But humans have a great ability to adapt, and one of the things we learn as we develop is that delayed reinforcers are sometimes worth the wait. Paychecks may not be issued until the end of the month and grades aren't given until

the end of the grading period, yet they still influence us. In fact, the ability to delay gratification is a real advantage. For example, children who prefer a big reward in the future over a smaller reward now—perhaps by saving their allowance for a desired toy rather than spending it each week on candy—are likely to become higher-achieving adolescents than children who prefer immediate gratification (Mischel et al., 1989).

primary reinforcement Something that is naturally reinforcing, such as food (if you were hungry), warmth (if you were cold), and water (if you were thirsty).

secondary reinforcement Something that you have learned to value, like money.

Primary Versus Secondary Reinforcement

Primary and secondary reinforcement are similar in that they both affect the frequency of behaviors, but they differ in one important way. A **primary reinforcement** is something that is naturally rewarding, such as food (if you are hungry), warmth (if you are cold), and water (if you are thirsty). A **secondary reinforcement** is something you have *learned* is rewarding because it has been paired with a primary reinforcer (see **Figure 15.3**).

Money, for example, is a secondary reinforcer because you have learned you can use it to purchase various forms of primary reinforcement, such as pizza and clothes. But money itself is not naturally rewarding. If you give a $100 bill to a 6-month-old baby, he will probably put it in his mouth to see if it tastes good. (He's checking for a primary reinforcer!) When the baby discovers the money doesn't taste good, he will spit it out and show no further

PRIMARY REINFORCEMENT
Sit!
Food is a primary reinforcer for a dog.
SECONDARY REINFORCEMENT
Come!
Good girl!
An owner's words can become secondary reinforcement when they're associated with petting and approval.

Figure 15.3
Primary and Secondary Reinforcements

Primary reinforcers, such as food, are naturally rewarding. Secondary reinforcers are rewarding because we have learned that they are associated with primary rewards.

interest. Is this how you respond when given a $100 bill? Not likely! For you, that piece of paper has value—so much value that you would work hard to get more. And if you really are hungry, the money becomes even more valuable to you—in one experiment, participants were less likely to donate to charities if asked when they were hungry (Briers et al., 2006).

Grades are a major influence on student behavior. Are they a primary or a secondary reinforcement? If you said "secondary," you're right. You had to learn the value of grades. Without this learning, grades have no value. (Try training your dog by giving a B+ for sitting or heeling, instead of a primary reinforcement in the form of attention or a dog biscuit.) Some students never learn to associate much value with school grades, so grades have little effect on their behavior.

PAUSE NOW OR MOVE ON

Turn to page 286 to review and apply what you've learned.

Punishment

WHAT'S THE POINT?

15-4 How does punishment influence behavior?

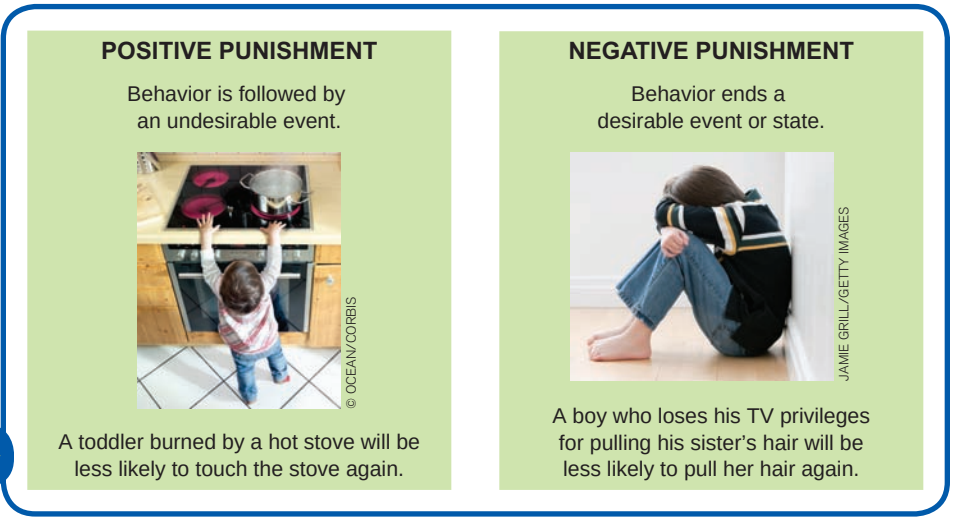
The Process of Punishment

We noted earlier in this module that punishment *weakens* a behavior, or makes it less likely to occur again in the future. Punishment can take either of two forms (see **Figure 15.4**):

- The first, positive punishment, occurs when the behavior leads to something undesirable. Positive punishment is anything that decreases the

Figure 15.4
Punishment Weakens Behavior

Here are two forms of punishment, positive and negative. In one, the punished behavior is followed by an undesirable event, which is *added.* In the other, the punished behavior is followed by the loss of a desirable event or state, which is *subtracted.* Although the types of punishment differ, each decreases the likelihood that the behavior will happen again.


POSITIVE PUNISHMENT
Behavior is followed by an undesirable event.
© OCEAN/CORBIS
A toddler burned by a hot stove will be less likely to touch the stove again.
NEGATIVE PUNISHMENT
Behavior ends a desirable event or state.
JAMIE GRILL/GETTY IMAGES
A boy who loses his TV privileges for pulling his sister's hair will be less likely to pull her hair again.

likelihood of a behavior by following it with an undesirable event or state. For example, if a toddler puts her hand on a painfully hot stove burner, the behavior of touching the burner is punished because it leads to an undesirable event: getting burned (Ouch!). Because stove touching has been punished, that behavior is less likely to happen in the future.

- The second form of punishment, negative punishment, occurs when the behavior ends something desirable. Negative punishment is anything that decreases the likelihood of a behavior by following it with the removal of a desirable event or state. Let's say a young boy pulls his sister's hair while watching television and his father takes away TV privileges for the rest of the day. The behavior of hair pulling has ended something desirable—watching television. The loss of privileges should make the boy's hair-pulling behavior less likely to occur in the future. Parking tickets are another example of punishment that removes something desirable. If I engage in the behavior of illegal parking and then have to pay some of my desirable money, I should be less likely to park illegally in the future.

Note that this is exactly parallel to what we learned about positive and negative reinforcement. *Positive* and *negative* are again being used in the mathematical sense and do not imply that one type of punishment is good while the other one is bad. Positive punishment simply means that something undesirable is *added*. Negative punishment means that something desirable is *subtracted*.

Problems With Punishment

Many learning experts oppose the use of punishment, especially physical punishment, to control behavior (Gershoff, 2002; Marshall, 2002). They feel that punishment is likely to backfire in the long run for a variety of reasons. For starters, punishment does not end the desire to engage in a behavior. Children punished for using inappropriate language often continue to use the bad language—just not in the presence of the one who punished them for it. Likewise, adults punished for speeding may simply purchase a radar detector rather than drive moderately.

Punishment can also lead to fear and anxiety. Children or animals punished frequently may learn to engage in *avoidance* behaviors: Harshly punished children may run away from home, and harshly punished students may drop out of school. A final criticism of punishment is that when adult role models use aggression to solve their problems, children can learn to model that aggressive behavior as a problem-solving strategy. This may help explain why abusive parents tend to come from abusive families (although, impressively, most abused children do not go on to become abusive parents) (Straus & Gelles, 1980).

So, despite all these problems, why is punishment used so often? One reason seems to be that when a punished individual stops misbehaving, even for just a few minutes, this consequence negatively reinforces the behavior it followed—which in this case is punishment. This consequence in turn makes the punishing behavior more likely to happen in the future. The result is a vicious cycle: Punishment leads to *temporary* suppression of misbehavior, which reinforces the punishment, which is then even more likely to be used

Pros and Cons of Punishment

Punishment, under the right circumstances, can decrease behavior, but it also has several undesirable side effects. It can produce fear and anxiety.

ROB LEWINE/GETTY IMAGES

when the suppressed misbehavior inevitably returns, which leads to another reinforcing, temporary suppression, and so on.

There is a role for punishment in learning, but it is a limited one. Swift, sure punishment can effectively control certain behaviors (Larzelere & Kuhn, 2005), especially if the punisher's goal is to protect a child from a dangerous situation. For example, if a toddler has developed the bad habit of running into the street, a harsh reprimand or swat on the behind may be appropriate. A young child needs to develop some fear and avoidance of the street. But punishment is generally most effective when used least. Have you ever had a class where the teacher was constantly punishing the students by losing her temper and yelling at the class? How effective was the teacher's behavior after it occurred several times? Compare that scenario with a class's reaction to angry behavior on the part of a teacher who rarely yells and screams. If your memories are similar to mine, you'll see that the less often punishment happens, the more effective it is.

For all the reasons we've discussed here, most psychologists recommend *reinforcing an incompatible behavior* as an effective alternative to punishment. Rather than punishing a child for lying, for example, parents might consider reinforcing the child for telling the truth. This will increase the amount of truth telling, and because a child cannot tell the truth and lie at the same time, the amount of lying must decrease. The basic philosophy here is to "catch the child being good" and reinforce accordingly. This approach will lead to a more gradual change of behavior, but the change will be more permanent than the temporary suppression of behavior that follows punishment. Reinforcement also has two other benefits. First, it tends to lead to *approach* behaviors that draw people together (one reason kids are often so eager to see their mostly reinforcing grandparents) rather than feelings of fear and anxiety. Second, children who model positive reinforcement are more fun to be with than children who model aggressive behaviors.

PAUSE NOW OR MOVE ON

Turn to page 286 to review and apply what you've learned.

Reinforcement Procedures

WHAT'S THE POINT?

15-5 How can you use operant conditioning to teach a new behavior or make an operantly conditioned behavior stop?

Now that you know a little bit about how reinforcement and punishment work, we can begin to explore some other procedures that make operant conditioning so useful. In this section, we show how you can use shaping to establish new behaviors and how discrimination and generalization can fine-tune when behaviors will occur.

Shaping

The law of effect says that reinforcing a behavior makes the behavior more likely to occur in the future. But how can you apply operant conditioning to a behavior that hasn't yet occurred? To do this, Skinner developed a technique called **shaping,** reinforcement of behaviors that are increasingly similar to the one you want to occur. Shaping is the operant conditioning technique used to establish new behaviors. When you shape a behavior, you positively reinforce behaviors that move ever closer to the target behavior.

To train a pigeon to turn in clockwise circles, for example, you would start by providing a food reward every time the pigeon turns its head to the right. Pigeons turn their heads frequently, and the law of effect says that reinforcing this behavior will cause the pigeon to turn its head to the right more often. Now the trick is to gradually extend how far the pigeon must turn its head before you give it a food reward. After a series of increasingly longer turns, the pigeon will finally turn all the way around. By breaking the circling behavior into a succession of gradual steps, you can easily shape it.

Many other examples of shaping happen in everyday life. Remember when you learned to ride your bicycle without training wheels? Chances are, someone held the seat, ran beside you until you were reasonably well balanced, and then let go. You probably managed to roll several feet on your own before falling, at which point you were rewarded with a hearty "Good job!" It really wasn't that good a job—you only made it a few feet—but for a first attempt it deserved reinforcement. Gradually, as your riding skills improved, your trainer made you ride farther and farther before giving you a compliment. You were being shaped!

MARC ROMANELLI/THE IMAGE BANK

Shaping

When this child falls, as she surely will, Dad will praise her attempt. Parents who give such praise know that it is important to provide reinforcement following first attempts, even if they are failures, to encourage a child to ride ever farther.

Discrimination and Extinction

Shaping is useful for training behaviors that otherwise probably wouldn't happen. Other issues that make operant conditioning useful include *discrimination* and *extinction*. **Discrimination** is the ability to distinguish among similar signals or stimuli. **Extinction** is the loss of a learned response when a consequence no longer follows it.

JEFF GREENBERG/GETTY IMAGES

Discrimination

This trainer is teaching the dolphin to discriminate between different hand signals. Reinforcement—a fish treat—is provided only when the animal performs the proper behavior for that signal.

shaping Reinforcement of behaviors that are increasingly similar to the desired one; the operant technique used to establish new behaviors.

discrimination The ability to distinguish between two similar signals or stimuli and produce different responses.

extinction In operant conditioning, the loss of a behavior when no consequence follows it.

Signals Can Be Powerful

A pet's behavior is occasionally reinforced with a bowl full of food after hearing the can opener. That's enough to send them running every time they hear it!

DENNIS THE MENACE

DENNIS THE MENACE® USED BY PERMISSION OF HANK KETCHAM AND © BY NORTH AMERICA SYNDICATE.

"I think Mom's using the can opener."

Life would be fairly chaotic if we made the same response to all stimuli that were similar. For safety reasons, students and teachers need to learn to *discriminate* between class bells and fire alarms. We do this by learning the difference between the similar signals. What signal tells you it's time to leave the classroom at the end of the period? How does it differ from the fire alarm signal? And "false-alarm" fire drills—where students are immediately called back to class before they've even left the building—need to be kept to a minimum to prevent the extinction of the evacuation response.

Sometimes, however, *extinction* is a good thing. If the mom in the checkout line at the beginning of this module had managed to ignore her child's tantrums, those behaviors would eventually have died out on their own. Remember that without reinforcement, behaviors learned through operant conditioning will disappear.

Without discrimination, we wouldn't know when to answer the phone and when to answer the door. We wouldn't know whether to say, "Hi, Jill," or, "Hi, Jane," when a friend comes into view. Without extinction, we wouldn't stop repeating the same unsuccessful chess strategy or stop flirting with someone who doesn't respond to our interest. These operant conditioning concepts can help us understand why certain behaviors thrive and others die out. Your reading behavior has obviously not extinguished, so let's continue!

PAUSE NOW OR MOVE ON

Turn to page 287 to review and apply what you've learned.

Schedules of Reinforcement

WHAT'S THE POINT?

15-6 What are the advantages and disadvantages of different schedules of reinforcement?

What do buying food from a vending machine and playing the lottery have in common? They are both behaviors maintained by positive reinforcement. However, you're more likely to continue playing the lottery after having purchased a losing ticket than you are to put more money into a vending machine that has just failed to produce the desired potato chips. This is

because the two examples illustrate different schedules of reinforcement—continuous reinforcement for the vending machine and partial reinforcement for the lottery.

Continuous Reinforcement

In **continuous reinforcement,** a reward follows every correct response, just as a vending machine is supposed to do. The vending machine trains you to behave in a certain way—inserting your money in the machine—by continuously reinforcing your behavior. If you put the money in properly, you will be reinforced every time by receiving a bag of potato chips.

Continuous reinforcement is most useful for establishing new behaviors. Lots of reinforcement is often necessary when you are trying to teach someone to do something new, such as to speak a new language. One problem with behaviors that have been continuously reinforced, however, is that they are quite easy to extinguish. If the learner is used to being reinforced for each correct behavior and the reinforcement stops, extinction will occur rapidly. Think about how you behave when you put money in a vending machine and the machine doesn't dispense your product. Do you quickly put more money in? Probably not! When the goal is to establish behavior that is resistant to extinction, one of the partial reinforcement schedules works better.

Partial Reinforcement

In **partial reinforcement schedules,** a reward follows only some correct responses. When our behavior is reinforced *intermittently* (only some of the time), hope springs eternal and we are reluctant to give up. If a vending machine is a good example of continuous reinforcement, a lottery is a good example of partial reinforcement. People don't expect to win every time they buy a ticket. Therefore, they will continue to buy tickets even if they don't win. As lottery commissions know, partial reinforcement schedules produce behavior that is hard to extinguish.

There are four partial reinforcement schedules (Skinner, 1961). Two of the partial reinforcement schedules, called *interval schedules,* focus on the time that elapses between reinforcements. The other two partial reinforcement schedules, called *ratio schedules,* focus on the number of responses before reinforcement occurs. Let's take a closer look at each of these four partial reinforcement schedules.

continuous reinforcement In operant conditioning, a schedule of reinforcement in which a reward follows every correct response.

partial reinforcement schedule In operant conditioning, a schedule of reinforcement in which a reward follows only some correct responses.

fixed-interval schedule In operant conditioning, a partial reinforcement schedule that rewards only the first correct response after some defined period.

Fixed-Interval Schedule

A **fixed-interval** partial reinforcement schedule rewards only the first correct response after some defined period of time has passed. For example, a researcher might always reinforce the first time a rat presses a bar after 60 seconds have passed. After receiving a food pellet (a reinforcement) for that response, the rat has to wait 60 seconds before it will be reinforced for another correct response. The interval (60 seconds) is

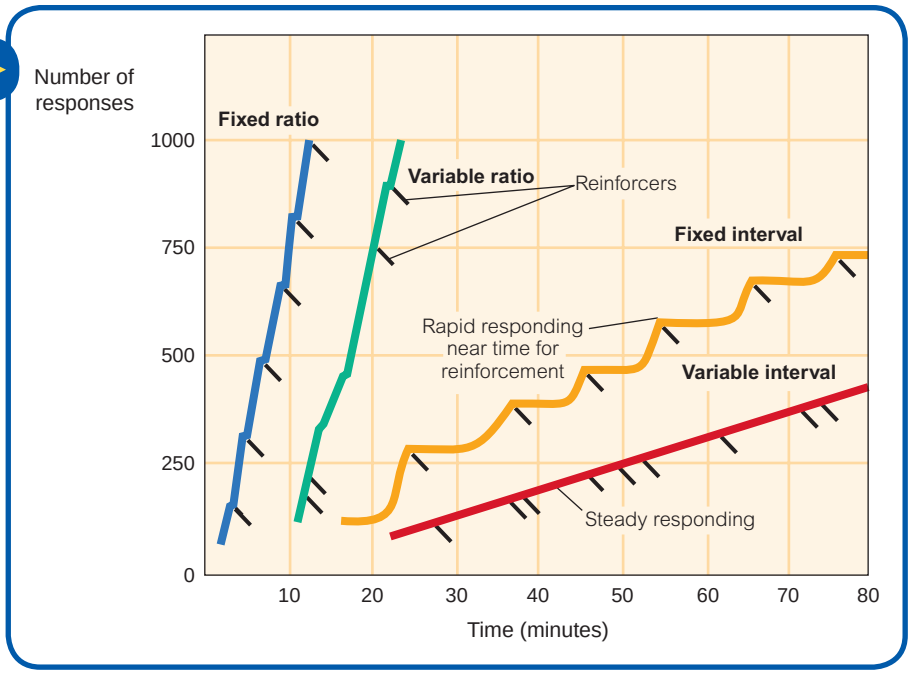


Figure 15.5
The Cumulative Record

Skinner used graphs like this one to track the responses of pigeons and rats. The horizontal axis of the graph measures time, and the vertical axis measures total responses. The small slash marks indicate points at which the animal received a reinforcement (such as a food pellet). The slopes of the lines connecting the slashes show the rate of responding—a steeper line indicates more responses per minute. Skinner's pigeons showed these four patterns of responding for the partial schedules of reinforcement. Notice that the ratio schedules produce a faster response rate (a steeper line) than the interval schedules. (Adapted from Skinner, 1961.)

unchanging, and there is no way the rat can earn reinforcement until the end of that 60-second interval—thus the term *fixed-interval schedule*.

A rat experienced with a fixed-interval schedule learns not to respond during the first part of the fixed time interval, when there is no way to earn a reinforcement. Toward the end of the interval, the rat starts pressing the bar, "checking" to see if the time is up. The rate of checking increases as the end of the fixed interval approaches. The result is the response pattern you can see in **Figure 15.5.**

Do fixed-interval schedules happen in real life? You bet! Have you ever had a class with a quiz every Friday? If so, you were being reinforced (with a good grade) for your behavior (studying) on a fixed-interval (once a week) schedule. Did you study much for the quiz on Monday, Tuesday, or Wednesday? Many students don't. Instead, they pack the main part of their responding (studying) into the end of the interval (Thursday night), just as the rats did in Skinner's research on fixed-interval schedules.

Variable-Interval Schedule

A **variable-interval** partial reinforcement schedule rewards the first correct response after an unpredictable amount of time has passed. The amount of time changes after each reinforcement, so a bar-pressing rat has no way to know how long the interval will be. The rat must keep "checking" by pressing the bar to see whether anything happens. When the variable interval is up, the next correct press on the bar earns the rat its reward.

variable-interval schedule
In operant conditioning, a partial reinforcement schedule that rewards the first correct response after an unpredictable amount of time.

Recall that on the fixed-interval schedule, the rat (or the student) can sit out the first part of the interval (that is, not respond) without risking the loss of a reward. Not so on a variable-interval schedule, where any given time interval might be short. Instead, the rat learns to respond at a moderate, steady rate, as Figure 15.5 shows. Faster responding doesn't result in

many extra rewards, so response rate is not very important with a variable-interval schedule.

Pop quizzes use a variable-interval schedule. When a quiz can occur at any time, you have to study a little bit each day. If there is no quiz today, there may be one tomorrow. If there is a quiz today, there may be another one tomorrow. To earn the most reinforcement (good grades on your quizzes), you must be a steady studier.

fixed-ratio schedule In operant conditioning, a partial reinforcement schedule that rewards a response only after some defined number of correct responses.

variable-ratio schedule In operant conditioning, a partial reinforcement schedule that rewards an unpredictable number of correct responses.

Fixed-Ratio Schedule

A **fixed-ratio** partial reinforcement schedule provides a reward only after a certain number of correct responses. The word *ratio* in the term refers to the ratio of reinforcements to responses, such as 1 reinforcement for every 20 correct responses. Fixed-ratio schedules do place a premium on speedy responding: The faster the rat makes the required number of responses, the faster it will be fed, which means more to eat for a hungry rat. A rat with some experience on the fixed-ratio schedule will run through the required number of responses rapidly. As you can see in Figure 15.5, it will then take a short break. After "catching its breath," the rat will run through the next set of responses as rapidly as possible.

Coffee shops that run "buy 10, get 1 free" specials are using a fixed-ratio schedule of reinforcement. You may have found yourself buying 10 lattes quickly to qualify for your reinforcement—the free drink. After enjoying your free coffee, you may not buy again for a while. (You're probably a little sick of coffee after drinking several a day!) However, after "catching your breath" for a few days, you may be back to ordering double espressos again to earn the next free drink.

Variable-Ratio Schedule

A **variable-ratio** partial reinforcement schedule rewards an unpredictable number of correct responses. The number of correct responses is unpredictable because it changes after each reinforcement. Rats on a variable-ratio schedule tend to respond fast and to continue responding after receiving a reinforcement. After all, the next response *could*

PAUL DOYLE/ALAMY IMAGES

Schedules of Reinforcement in Real Life

This gambler is being reinforced on a variable-ratio schedule. She does not know how many times she has to play to win. The variable-ratio schedule produces a high, steady response rate, much to the delight of the casino owners.

be the one that pays off, and the only way to find out is to make that response. A variable-ratio schedule also produces tremendous resistance to extinction. Skinner (1953) found that pigeons sometimes pecked 150,000 times without a reward after having been on a high variable-ratio schedule.

No wonder, then, that the variable-ratio schedule is sometimes called the "gambler's schedule." Lottery tickets and many other forms of gambling pay off on a variable-ratio schedule. People who buy lottery tickets never know which ticket will win, but they do know that the more tickets they buy, the better their chances of winning will be. The trouble is that most lotteries are designed to give a large number of small payouts, big enough to provide reinforcement for purchasing a ticket but small enough to ensure that most people will lose more money than they win. I stood behind a woman in the grocery store one day and watched her spend $5 on five scratch-off tickets. Four were losers, and the fifth paid off with two "free" tickets. One of these paid $2, and as she left she turned to her friend and said, "I won!" She had actually lost $3 ($5 minus her $2 win), yet her small win had reinforced her ticket-buying behavior. Do you think she was motivated to buy additional tickets the next time she was at the store?

PAUSE NOW OR MOVE ON

Turn to page 287 to review and apply what you've learned.

New Understandings of Operant Conditioning

WHAT'S THE POINT?

15-7 How do cognition and biology affect the operant conditioning process?

Cognition (our thought processes) affects all types of learning, including operant learning. Furthermore, our biology sets boundaries for how and what we can learn.

The Role of Cognition

With **latent learning,** the learning occurs but is not apparent until the learner has an incentive to demonstrate it. Latent learning is probably the best example of how our thinking—not just whether we are reinforced—affects our learning. In a now-classic experiment, researchers demonstrated how a **cognitive map,** or mental representation of a place, can influence learning (Tolman & Honzik, 1930). In this experiment, researchers trained one group of rats to find its way through a maze by putting a food reward in a box at the end of the maze. As the number of trials increased, the rats

latent learning Learning that occurs but is not apparent until the learner has an incentive to demonstrate it.

cognitive map The mental representation of a place.

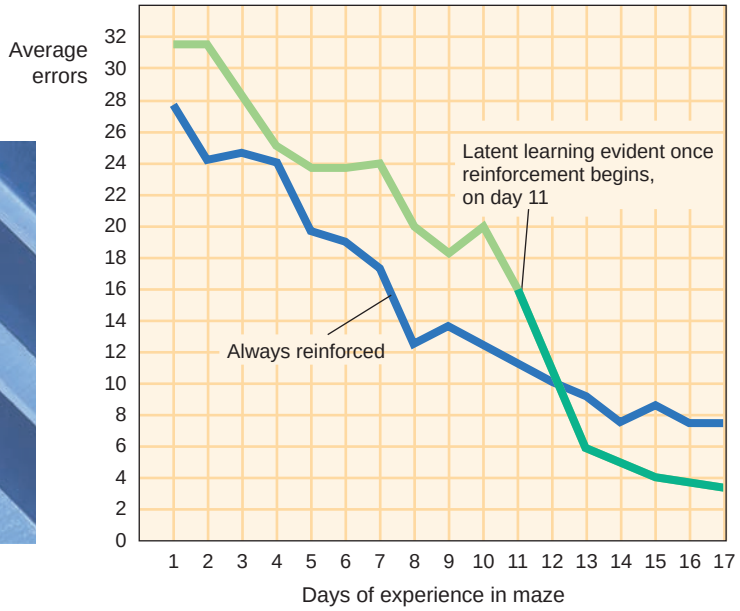


Figure 15.6
Learning Without Reward

If this rat is allowed to wander through the maze on several occasions, it will develop a cognitive map of the maze—an example of latent learning. But the rat will not demonstrate that learning until researchers add some positive reinforcement for showing the knowledge of the maze paths. (From Tolman & Honzik, 1930.)

in this group completed the maze faster and faster (see **Figure 15.6**). The researchers also placed a second group of rats in the maze, but they did not reward them with food for finding the end of the maze. Rats in this second group wandered through the maze, exploring it, but their times did not improve during this first phase of the experiment. In the second phase of the experiment, the researchers put a food reward in the box at the maze's end for the second group of rats. Now the performance of the second group of rats rapidly improved until they made fewer errors than the first group. The rats in the second group had developed a cognitive map as they wandered through the maze in the first phase of the experiment. They had learned, but the learning occurred cognitively before it was expressed behaviorally.

The **overjustification effect** provides more support for cognition's role in operant conditioning. Rewarding an already enjoyable behavior overjustifies it and may actually *decrease* the frequency of that behavior. This is the direct opposite of the effect Skinner's principles would predict—an increase in the rewarded behavior. Unfortunately, overjustification sometimes happens in school. Activities like reading, which should be (and are) naturally reinforcing for most young children, can be overjustified if the school provides lots of special rewards, such as gold stars, grades, and special parties for meeting reading goals. The danger is that these rewards may begin to overwhelm the child's natural motivation to read and become the primary means of maintaining the behavior. When the rewards stop, the behavior stops as well. ("What, I don't get free pizza for reading 10 books?")

Even grades can lead to overjustification. One experiment divided fifth graders into two groups. The researchers told one group to read a passage and informed students in the group that they would be graded on how much they'd learned. They told the other group that they should read the passage

overjustification effect The effect of promising a reward for doing what one already likes to do; the reward may lessen and replace the person's original, natural motivation so that the behavior stops if the reward is eliminated.

Thinking About POSITIVE PSYCHOLOGY

Learning New Habits

If you could learn or develop one new habit, what would it be? Eating healthier? Exercising more? Keeping track of your stuff better? Positive psychologists are learning how to best change a behavior you'd like to improve. More specifically, they're learning how to grow the skills you need to create the habits you want in life.

Not surprisingly, learning a new habit involves self-control (often called *self-regulation* by psychologists). Self-control is the process of exerting control over your thoughts, feelings, and actions (Maymin, 2007). The less self-control you have, the harder it is to learn and develop a new habit. So, if self-control is not one of your strengths, does this mean you're out of luck when it comes to learning a new habit? *No.* It turns out that there is a fairly simple way to increase your self-control.

Joseph Forgas, Roy Baumeister, and Dianne Tice (2009) have learned that one of the best things you can do to gain the self-control you need to create a new habit is to practice self-control over *any* area of your life. They explain what this means by using the results from two studies. In the first, participants were asked to exert self-control over spending money for several months. In the second, participants were taught an exercise routine and instructed to follow the routine every day for two months. What the researchers found was that while saving money increased in the first study, and participants lost weight in the second, there were also unanticipated side benefits. The self-control used on finances and exercise showed up in *other* aspects of the participants' lives. Not only had they saved money or improved their health, but they also reported studying more, watching less television, and doing more household chores that they usually avoided. The narrowly focused self-control of the participants was like a muscle that was made stronger through regular use. It made it easier for these individuals to exert self-control more widely in other aspects of life.

So, if you want to build up the self-control skills you need to change bad habits or to learn new good habits, start by trying to control one thing that doesn't turn your world upside down. That is, start with something that only requires a little self-control. Tell yourself you're only going to check Facebook twice a day, and for no longer than 30 minutes ever. As psychologist Senia Maymin puts it, "Structure something concrete into your life. That's the best way to develop self-control."

but they wouldn't be graded, simply questioned to find out what they remembered. There was little difference in how much the two groups remembered, but the second group thought the passage was more interesting (Grolnick & Ryan, 1987). There seems to be a link between external, environmental rewards and internal, cognitive factors. If we ignore cognition, we won't get the whole picture about how operant conditioning works. (To see how cognition can influence personal habits for the better, see Thinking About Positive Psychology: Learning New Habits.)

The Role of Biology

Why don't the principles of operant conditioning work equally well for all behaviors in all species?

Like cognition, biology clearly influences how we learn and what we learn, including what we learn through operant conditioning. Some species

are *biologically predisposed* to learn some behaviors easily and other behaviors only with great difficulty.

Pigeons, for example, easily learn to flap their wings to avoid a mild electric shock and to peck at a disk for food. Operant conditioning principles would suggest that you could reverse these two behaviors and teach the birds to flap for food and peck to avoid shock. This turns out to be difficult, however, because it defies the biological tendencies of the species (Foree & LoLordo, 1973). Wing flapping is a natural defense mechanism for pigeons and thus lends itself well to avoidance behaviors. Pecking is a response naturally associated with eating, so pigeons easily learn to peck for food.

LIONEL CIRONNEAU/AP/WIDE WORLD PHOTOS

Matching the Species to the Behavior

Operant conditioning works best when it focuses on behaviors that come naturally to a species, such as jumping-up behaviors in dogs.

PAUSE NOW OR MOVE ON

Turn to page 287 to review and apply what you've learned.

Operant conditioning offers practical and useful techniques for altering behavior in families, schools, and workplaces. When I was a child, my parents kept a checklist of chores I had to complete each week before receiving my allowance. This policy was based on operant conditioning principles. So is my school's Renaissance Program, which rewards students who earn high grades with gift certificates and special privileges. So was the system of bonuses that kept my son motivated during his brief career in telemarketing. Operant conditioning can indeed change the way people act, and like all science-based theories, it is alive and changing. New research has shed light on cognitive and biological factors that influence operant procedures, which helps us employ these principles even more effectively.

ERIK ISAKSON/GETTY IMAGES

Individualized Learning

Many electronic instructional programs take advantage of operant conditioning principles. This girl will have her answers shaped by a program that breaks instruction down into a series of easy steps. She will receive positive reinforcement for each correct answer.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 15

Thinking About Operant Conditioning

The Nature of Operant Conditioning

WHAT'S THE POINT?

15-1 What is operant conditioning?

- Operant conditioning is a type of learning in which the frequency of a behavior depends on the consequence that follows that behavior.

Apply What You Know

1. In operant conditioning, the frequency of a behavior is determined by the behavior's _____.
2. Which of the following is an example of operant conditioning?
   a. A dog that is given a piece of food after begging at the dinner table learns to beg more frequently.
   b. A boy who watches his brother ride a bicycle learns how to ride a bicycle.
   c. A girl practices spelling *Mississippi* until she learns to spell it perfectly.
   d. A baby learns to startle every time the doorbell rings.

The Law of Effect

WHAT'S THE POINT?

15-2 What is the law of effect?

- Edward Thorndike's law of effect states that behaviors with favorable consequences (reinforced behaviors) will occur more often and behaviors followed by less favorable consequences (punished behaviors) will occur less often.

Apply What You Know

3. _____ is any consequence that decreases the future likelihood of a behavior.
4. _____ is any consequence that increases the future likelihood of a behavior.

Reinforcement

WHAT'S THE POINT?

15-3 What are the different kinds of reinforcement?

- Behavior can be increased with positive or negative reinforcement.
- Immediate reinforcement is more effective than delayed reinforcement.
- Reinforcement can be primary (naturally rewarding) or secondary (learned).

Apply What You Know

5. Explain the distinction between positive and negative reinforcement.
6. Which of the following is an example of negative reinforcement?
   a. A twisted ankle hurts less after taking Tylenol.
   b. A husband gets a kiss on the cheek from his wife after he takes out the garbage.
   c. A third grader reads five books for a gold star award at school.
   d. A football player goes to the weight room every day to gain strength.

Punishment

WHAT'S THE POINT?

15-4 How does punishment influence behavior?

- Behavior can be decreased with positive or negative punishment.
- Punishment can create problems when used to control behavior: Punishment does not end the desire to engage in a behavior, punishment can lead to fear and anxiety, and children may imitate aggressive forms of punishment (such as spanking).

- Punishment can be an effective way to stop dangerous behaviors if it is used immediately and only occasionally.

Apply What You Know

7. Positive punishment decreases the frequency of behavior. Negative punishment _____ the frequency of behavior.
8. What are two reasons why psychologists usually oppose the use of spanking?

Reinforcement Procedures

WHAT'S THE POINT?

15-5 How can you use operant conditioning to teach a new behavior or make an operantly conditioned behavior stop?

- New behaviors can be shaped by reinforcing behaviors that are increasingly similar to the desired behavior.
- Discrimination occurs when the learner behaves differently toward similar stimuli.
- The extinction or loss of a learned behavior occurs when a consequence no longer follows it.

Apply What You Know

9. Describe how you'd use shaping to teach a young child how to play catch with a Nerf ball.
10. We know to stop at a red light and go when the light turns green because of _____.

Schedules of Reinforcement

WHAT'S THE POINT?

15-6 What are the advantages and disadvantages of different schedules of reinforcement?

- Continuous reinforcement, useful for establishing new responses, occurs when a reward follows every correct response.
- It is harder to extinguish behavior that has been maintained with a partial reinforcement schedule, in which a reward follows only some correct responses.
- Partial reinforcement can reward behaviors after a period of time has passed (fixed interval and variable interval), or it can provide a reward only after a particular number of responses (fixed ratio and variable ratio).

Apply What You Know

11. Reinforcing only some correct responses is called
    a. partial reinforcement.
    b. negative reinforcement.
    c. primary reinforcement.
    d. continuous reinforcement.
12. If you don't know when to expect text messages from your friends, checking to see if you've received a text is reinforced on a _____ schedule.
    a. variable interval
    b. variable ratio
    c. fixed interval
    d. fixed ratio

New Understandings of Operant Conditioning

WHAT'S THE POINT?

15-7 How do cognition and biology affect the operant conditioning process?

- Latent learning and cognitive maps are examples of how our thinking—not just whether we are reinforced—affects our learning.
- The overjustification effect occurs when a reward replaces a person's original motivation so that a behavior stops if the reward is eliminated.
- Some species are biologically predisposed to learn some behaviors easily and other behaviors only with great difficulty.

Apply What You Know

13. Rewarding individuals for behavior they already enjoy may cause them do the behavior less when the rewards stop. This is called the _____ effect.

14. Latent learning demonstrates the importance of _____ in operant conditioning.

a. cognition
b. biology
c. punishment
d. extinction

KEY TERMS AND KEY PEOPLE

operant conditioning, p. 267
reinforcement, p. 269
punishment, p. 269
positive reinforcement, p. 271
negative reinforcement, p. 272
primary reinforcement, p. 273
secondary reinforcement, p. 273
shaping, p. 277
discrimination, p. 277
extinction, p. 277
continuous reinforcement, p. 279
partial reinforcement schedule, p. 279
fixed-interval schedule, p. 279
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fixed-ratio schedule, p. 281
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latent learning, p. 282
cognitive map, p. 282
overjustification effect, p. 283
Edward Thorndike (1874–1949), p. 268
B. F. Skinner (1904–1990), p. 268

MODULE 16

Observational Learning

The Nature of Observational Learning

- Albert Bandura's Experiments
- Mirror Neurons

Observational Learning in Everyday Life

Observational Learning of Violence From the Media

Believe it or not, the most famous experiment of observational learning was done with an inflatable Bobo doll. In this module, you'll find out what Albert Bandura learned from this children's toy.

How much have you learned by watching others? Can you imagine what it would be like to drive a car if you had never seen another person do it? Even if you'd been able to read the owner's manual (which explains how the car works) and your state driver's manual (which explains the rules of the road), actually driving the car would be next to impossible. It's one thing to read about transmissions, windshield wipers, and passing lanes, but it's something else entirely to watch other people driving.

This is the stuff of *observational learning,* and thank goodness we are capable of it. Can a child learn from watching her older siblings? You bet. Just as a Little Leaguer can learn from watching his favorite Major League player, a video gamer can learn from watching her expert-level friend, and a new employee can learn on the job from watching a more experienced colleague. Not only can we profit from our own experiences, we can also profit from the experiences of others. You may be surprised to learn that this is a type of learning shared with other species, including rats, birds, gorillas, and monkeys (Byrne & Russon, 1998; Dugatkin, 2002). The expression "monkey see, monkey do" is true!

observational learning Learning by observing others.

model The person observed in observational learning.

modeling The process of observing and imitating a specific behavior.

The Nature of Observational Learning

WHAT'S THE POINT?

16-1 What is observational learning? What are the implications of Albert Bandura's experiments, and how can they be explained by mirror neurons?

Observational learning takes place by watching others. It differs from other kinds of learning in that another person—the **model**—actually practices or repeats behaviors, which the learner observes and mimics in a process called **modeling.** It's an amazing thing, isn't it, that we can learn by modeling our behavior after that of another person? This learning occurs in our brains as a cognitive process.

COURTESY OF ALBERT BANDURA, STANFORD UNIVERSITY

ALBERT BANDURA (1925–) Canadian-American psychologist who is a major figure in the study of observational learning and several other important topics.

Albert Bandura's Experiments

Canadian-American psychologist **Albert Bandura** conducted groundbreaking experiments in observational learning in the 1960s (Bandura et al., 1961). In one experiment, the researchers arranged for a young child to play in a room while an adult in another part of the room punched, kicked, and threw an inflatable Bobo doll (the kind that are several feet tall with a weighted base so they right themselves when knocked over). The adult's tirade lasted for about 10 minutes, and all the while the adult shouted things at Bobo like "Sock him in the nose. . . . Hit him down. . . . Kick him."

In the next step of the experiment, Bandura took the child to a playroom with many interesting toys. When the child was happily engaged with the toys, the researcher interrupted to say that the playing would have to stop because the cool toys were being saved "for the other children." The child, now frustrated, was then taken to yet another room and left alone with only a few less interesting toys—and Bobo.

Modeling Mom

Here, Mom is serving as the model for her daughter, who is modeling the use of chopsticks. She will be an expert in no time!

MARGOT GRANITSAS/THE IMAGE WORKS

COURTESY OF ALBERT BANDURA, STANFORD UNIVERSITY

How Would You Treat Bobo?

We learn by observing the behavior of others. Bandura's research showed that children imitated, with uncanny precision, the behaviors they saw modeled.

Bandura was interested in seeing how the child would now behave. He found that children who had observed an adult's violent behavior with the Bobo doll exhibited more aggression than children who hadn't observed the violent adult model. Children who had observed an attack on the Bobo doll not only were more aggressive but also mimicked the exact behaviors and words they had seen. Observational learning was at work.

In another variation of his research, Bandura (1965) studied the effect of consequences delivered to the *model*—in this case, the adult who demonstrated violent behavior for the child. Would such consequences affect the *observer*—in this case, the child observing the aggressive adult? We know that consequences—good and bad—affect how and what we learn. But what happens when we observe another person experiencing those consequences? To test this, Bandura produced a film that showed an adult model behaving and shouting aggressively ("Sockeroo!") toward the ever-present Bobo doll. For this film, however, the researchers could choose one of three endings:

1. Another adult rewards the violent adult model with praise and candy. One group of children saw this ending.
2. Another adult calls the model a "bad person" and spanks the model. A second group of children saw this ending.
3. The model receives neither a reward nor a punishment. A third group saw this neutral ending.

After viewing the video, each child in each group spent time in the playroom with the Bobo doll and other toys. Children who saw the violent model rewarded for aggression behaved most aggressively in the playroom, and those who saw the violent model spanked behaved least aggressively. This is referred to as **vicarious learning**—learning by seeing the consequences of

vicarious learning Learning by seeing the consequences of another person's behavior.

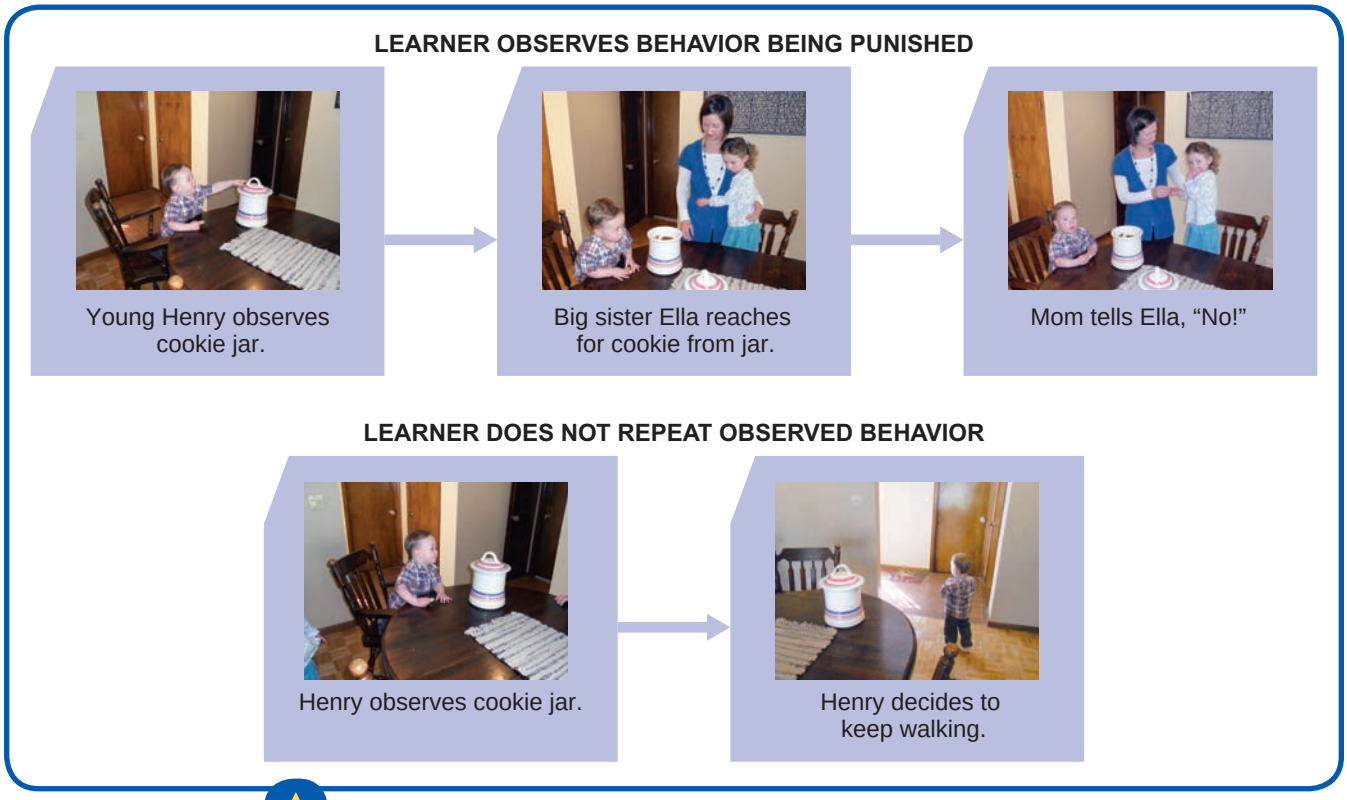
LEARNER OBSERVES BEHAVIOR BEING PUNISHED
Young Henry observes cookie jar.
Big sister Ella reaches for cookie from jar.
Mom tells Ella, "No!"
LEARNER DOES NOT REPEAT OBSERVED BEHAVIOR
Henry observes cookie jar.
Henry decides to keep walking.

Figure 16.1
Vicarious Learning

Not only do we learn when we receive consequences for our behaviors, but we also learn when we observe others getting consequences for their behaviors.

another person's behavior. When the consequence is a reward, the observer is more likely to repeat the behavior (see **Figure 16.1**).

In variation after variation, Bandura's experiments showed the same results—we learn by watching others if the following four conditions are met (Bandura, 1977):

1. *Attention*—To learn, you must be aware of the behaviors of those around you. A student who is attentive during cooking class stands a good chance of actually learning how to make an omelet!
2. *Retention*—You must remember the behavior you witnessed. Will the attentive student be able to retain—from one week to the next—all those details so expertly modeled by the driver education teacher?
3. *Ability to reproduce the behavior*—I have watched my sons skateboard many times, but I do not possess the required skills to do the tricks. Despite all my watching, my minimal sense of balance means I can barely stand on the board, even if it isn't moving!
4. *Motivation*—We are more likely to feel motivated to learn if the model we've observed has been rewarded for the behavior and if we like the model. The Nike corporation pays huge endorsement fees to star athletes because its advertising agency believes likable megastars are effective models.

Mirror Neurons

Italian researchers discovered a biological explanation for observational learning in the early 1990s (Blakeslee, 2006). They had implanted electrodes in the *frontal lobe* of a monkey's brain to track the activity of cells that controlled

when the monkey put food in his mouth. The researchers were amazed when they noticed the same cells showing the same activity when the monkey saw one of the researchers lick an ice cream cone. These brain cells are now known as **mirror neurons**—cells that activate *either* when an individual performs certain actions *or* when the individual observes someone else doing so. For example, in a monkey's brain these neurons function the same way when they are watching another monkey grasp an object as they do when the monkey grasps the object on its own (Rizzolatti et al., 2002; Rizzolatti et al., 2006).

mirror neurons Brain cells located in the front of the brain that activate when a person performs certain actions or when the person observes another do so.

It turns out that mirror neurons can help explain far more than such simple behaviors. Just as we can imitate the actions of another person, we can also imitate a person's emotional state (an ability known as empathy). Brain scans show that for both people and monkeys, the same mirror neurons are active when experiencing or observing an emotion (Iacoboni, 2008). Some now believe that "broken mirrors" (mirror neurons that don't function correctly) may explain the development of autism (Ramachandran & Oberman, 2006; Williams et al., 2006).

PAUSE NOW OR MOVE ON

Turn to page 296 to review and apply what you've learned.

Observational Learning in Everyday Life

WHAT'S THE POINT?

16-2 How can observational learning lead to prosocial and antisocial behaviors?

Children are capable of learning by observation almost from the beginning. Babies will imitate an adult who sticks out his tongue shortly after birth and will imitate gestures within the first year (Jones, 2007). This means that observations have a tremendous cumulative effect on behavior in both positive and negative ways. Children learn much that's appropriate from models, but—as demonstrated in the Bobo experiments—they also learn much that's inappropriate.

People are often unaware of the effect they have on others. Retired professional basketball star Charles Barkley repeatedly argued in the early 1990s that he was a basketball player, not a role model. (And in 2010, pop star Miley Cyrus argued similarly, declaring that fans shouldn't look to her for how to act.) It's easy to understand why he didn't want to be considered responsible for those mimicking his "bad boy" behaviors, but Barkley's position was not realistic. It is impossible to choose *not* to be a role model. If you're in the public eye as a professional athlete or entertainer, you are—by the nature of your position—a powerful

Antisocial Behavior Role Model

Outspoken music stars such as Kanye West create controversy because the public cannot agree about whether the modeled behaviors are appropriate. Can you think of other stars who create such controversy?

KEVIN MAZUR/WIREIMAGE/GETTY IMAGES

Prosocial Behavior Role Model

People will imitate either prosocial or antisocial behavior. The same learning principles apply no matter what behavior is modeled.

REX FEATURES VIA AP IMAGES

role model. Even those of us who are not in the public eye will almost certainly influence others. If you have younger brothers or sisters, rest assured they look up to you and learn from you how to behave in a variety of situations, just as you may have learned from older siblings. If a new person is hired at your place of work, or if you're a senior on a sports team, *you* are a role model. Whether you realize it or not, others are watching and learning from you.

But even if you can't control whether or not others will see you as a role model, you have control over the *kind* of role model you will be. You can model **antisocial behaviors,** which are negative and destructive, like some students in my school whose "leadership" resulted in a rash of vandalism in the name of "pranks" during homecoming week. Or you can model **prosocial behaviors,** which are positive and constructive, like other students in my school whose behavior spearheads an annual drive to collect tens of thousands of pounds of food for our local food bank. In each case, the actions (modeling) of a few students snowballed into a bigger trend. Your choices do make a difference!

PAUSE NOW OR MOVE ON

Turn to page 296 to review and apply what you've learned.

Observational Learning of Violence From the Media

WHAT'S THE POINT?

16-3 How does violence in the media affect violent behaviors and attitudes?

antisocial behavior Negative, destructive, unhelpful behavior.

prosocial behavior Positive, constructive, helpful behavior.

If you're one of the 90 percent of American teenagers who watch television every day (Gallup, 2002), by the time you graduate from high school, you will have spent more time watching television than you spent in school (Elliot,

1996). Not only does almost every home have a TV set, but most have more than one. And what about the content of all this TV programming? Much of it is undeniably violent. The average U.S. student has witnessed about 8000 murders and well over 100,000 violent acts by the end of elementary school (Huston et al., 1992). Only about half of these cases of violence portray pain or harm to the victim in a realistic way (Mediascope, 1995). The other cases show "sanitized" violence in which, for example, pointing and firing a gun is shown accurately but the pain and suffering of the victim is not. In such cases, viewers may learn how to behave violently but not gain an adequate appreciation for the true consequences of violent behavior. Keep in mind that these statistics relate only to television. Movies, video games, print media, and the Internet provide even more exposure to violence.

The key question is whether all this observation of violence makes any difference in real life. Research indicates it does. Bandura's experiments, and more like them, indicate that we learn aggression from what we observe. The American Psychological Association Commission on Violence and Youth (1993) reached these conclusions after an extensive review of the available research:

- Higher levels of viewing violence on television are associated with increased acceptance of aggressive attitudes and increased aggressive behavior.
- Children's exposure to violence in the mass media, particularly at young ages, can have harmful, lifelong consequences.
- Film and TV portrayals of women in victim roles and of ethnic minorities in aggressive and violent roles worsen the violence experienced by women and ethnic minorities.
- The viewing of TV programming and commercials affects our concept of reality and how we believe others live.

The commission also concluded that television *could* be an effective prosocial force. The media are sources of observational learning. Society can, however, choose whether the media will function as a prosocial or antisocial learning model.

Notice that our discussion and the American Psychological Association commission have focused on the effects of television, a form of media that is being supplemented by the Internet, video games, music, and movies. All of these contribute additional doses of daily violence to our lives.

CARMEN MARTÍNEZ BANÚS/ISTOCKPHOTO

Real-Life Instant Replay to Follow?

There is a connection between violence in the media and violence in society. Research indicates that we learn aggression from what we observe.

PAUSE NOW OR MOVE ON

Turn to page 296 to review and apply what you've learned.

We take, we give. We learn, we teach. Others have served as role models for you, and you serve as role models for others. Give some thought to the lessons you are providing for others, and choose carefully the models you follow.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 16

Thinking About Observational Learning

The Nature of Observational Learning

WHAT'S THE POINT?

16-1 What is observational learning? What are the implications of Albert Bandura's experiments, and how can they be explained by mirror neurons?

- Observational learning is learning by observing others.
- Bandura's famous Bobo doll experiments showed that children learned violent behavior from adult models.
- A biological explanation for observational learning has recently been discovered in the form of mirror neurons, which are brain cells located in the front of the brain that activate when performing certain actions or when observing another do so.

Apply What You Know

1. What was Albert Bandura trying to learn from his Bobo doll experiments?
   a. the best method to train aggressive behavior
   b. whether children will repeat aggressive behaviors modeled by adults
   c. whether children are naturally aggressive when they play with clown dolls
   d. the age at which children begin to imitate aggressive behavior
2. _____ neurons in the brain help explain how observational learning occurs.

Observational Learning in Everyday Life

WHAT'S THE POINT?

16-2 How can observational learning lead to prosocial and antisocial behaviors?

- Observational learning works equally well for antisocial and prosocial behaviors. It can lead children to imitate negative, antisocial behaviors or be a force for the learning of positive, prosocial behaviors.

Apply What You Know

3. Briefly describe a situation when students in your school modeled antisocial behavior.
4. Briefly describe a situation when students in your school modeled prosocial behavior.

Observational Learning of Violence From the Media

WHAT'S THE POINT?

16-3 How does violence in the media affect violent behaviors and attitudes?

- Watching violence in the media is correlated with acceptance of aggressive attitudes and increased aggression; this affects our ideas about how others live and what is "normal."
- Media sources can also encourage prosocial behaviors through observational learning.

Apply What You Know

5. Should parents be concerned about the amount of violence their children view?
   a. Yes, violent movies are more likely to produce aggression than other forms of media.
   b. No, observational learning of aggression occurs with real-life models but not media models.
   c. No, viewing movie violence is a safe way for children to express their aggression through fantasy.
   d. Yes, viewing violence in the media is associated with increased aggression.
6. Summarize the conclusions of the American Psychological Association Commission on Violence and Youth.

KEY TERMS AND KEY PEOPLE

observational learning, p. 290
model, p. 290
modeling, p. 290
vicarious learning, p. 291
mirror neurons, p. 293
antisocial behavior, p. 294
prosocial behavior, p. 294
Albert Bandura (1925–), p. 290

MODULE 17

Language Development

Building Blocks of Language

Language Acquisition

Language Stages

Our lives are awash in words. Words populate our songs, provide the basis for our conversations, and make TV shows understandable. This book is literally filled with them. How is it that language has become such an important part of our lives? Let's find out!

What if you couldn't share your thoughts and ideas with others? Our awesome ability to communicate is perhaps the most impressive of our *cognitive,* or mental, abilities. **Language** includes our spoken, written, or gestured words and the ways we combine them to communicate in a meaningful way. Without language, a tremendous amount of our technology would be useless—telephones, computers, radios, music players, and televisions are all, in essence, machines to help us communicate. The technological revolution enhanced our ability to use language, but communication was healthy long before the advent of high-tech tools. Books, newspapers, and letters all depend on language, as do the relationships we cherish with family and friends. Remove language and we sever our link to our past, forcing each generation to rethink, reinvent, and reexperience all the things our ancestors could have taught us.

language Our spoken, written, or gestured words and the ways we combine them to communicate meaning.

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Lessons in Culture

Language is one important way children learn about their culture. Human culture as we know it would not exist without language, which lets us transmit our ideas across barriers of time and space.

Building Blocks of Language

WHAT'S THE POINT?

17-1 What are the building blocks of language?

To build a house, you need materials and knowledge of the rules required to assemble the materials properly. A particular house might require concrete, wood, wires, shingles, windows, and so forth. If you try to assemble these parts without following construction and engineering principles, the house probably won't survive the first windstorm. Language is similar—we build our language from basic elements and follow rules to determine how we can combine the pieces.

The most basic building block is the **phoneme,** the smallest distinctive unit of sound in a language. Hundreds of phonemes, including clicks or tones, have been identified. The English language has about 40; the number of phonemes in other languages ranges from 20 to over 80. Notice that phonemes represent *spoken* sounds, not written symbols. (We will have more to say about written symbols later.)

As a young baby, you could produce all the phonemes of all the languages in the world—but only for a short time. The basic rule here is "use 'em or lose 'em." By the time you reached your first birthday, you lost your remarkable ability to babble in multiple languages and instead settled into using the phonemes of your native tongue. If you are a Japanese speaker, you may find distinguishing the English *r* and *l* sounds challenging because these sounds are not part of the Japanese language. English speakers have trouble with German's breathy *ch* sound (found in *Ich,* the German word for *I*). German speakers may struggle with the English *th* and thus may pronounce *this* as *dis*.

Even sign languages (there are over 200 different sign languages) use building blocks similar to phonemes, but in this case the "phonemes" are hand shapes and movements. It may be difficult to learn signs if you haven't used them in childhood. People who learn sign language in China and then come to America and learn to sign usually have an accent in the new language (Bellugi, quoted in Radetsky, 1994)!

● Fun with language: How do you pronounce *ghoti?* (Turn the page after making your best guess.)

phoneme In language, the smallest distinctive sound unit.

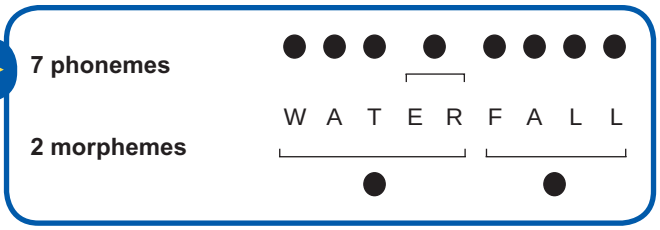


Figure 17.1
Phonemes and Morphemes

The word *waterfall* has seven distinct sounds, or phonemes. There are two morphemes, one to represent that wet stuff and one to indicate that it's cascading over a ledge.

Phonemes don't have meaning in and of themselves—the *p* sound doesn't mean anything, nor does the *f* sound. But we can combine phonemes to form a **morpheme**—the smallest unit that carries meaning in a language. Sometimes a single phoneme can also be a morpheme, as in *I*. More often, several phonemes combine to form a morpheme like *water,* which has four phonemes: *w, a, t,* and *r* (the written *e* has no sound of its own in this word). Words often have more than one morpheme. *Waterfall,* for example, has two: *water,* the liquid that fills lakes and rivers, and *fall,* the idea that the water is going over an edge and cascading downward (see **Figure 17.1**). How many morphemes do you think there are in *watered?* If you said two, you're right. In this case, the second morpheme is the *-ed* suffix, indicating an event that happened in the past. Every time you add a prefix or suffix to a word (like *un-* in *unwind* or *-less* in *motionless*), you've added a morpheme. The important thing to note is that these two building blocks—phonemes and morphemes—allow almost infinite flexibility in language. In spoken English, we use our 40 phonemes to construct an estimated 100,000 morphemes. With those building blocks of meaning, we can generate hundreds of thousands of words. From here, the estimates almost seem silly, with literally trillions of possible unique sentences (see **Figure 17.2**). The level of complexity that can be generated from simple building blocks is the distinguishing feature of language (Hauser et al., 2002).

morpheme In language, the smallest unit that carries meaning.

grammar The system of rules governing how we can combine phonemes, morphemes, and words to produce meaningful communication.

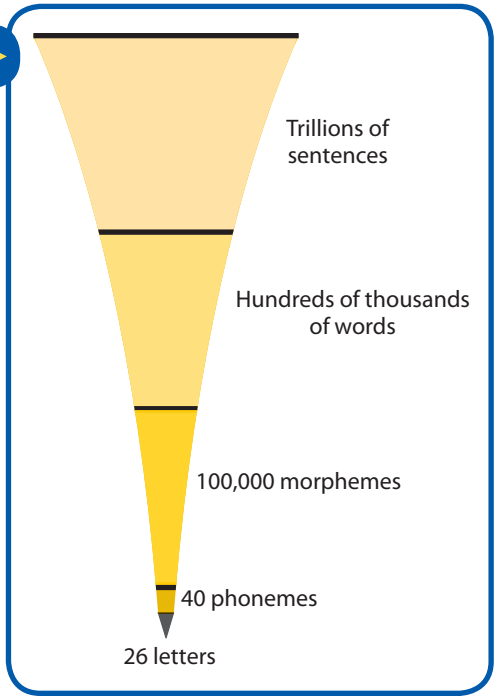


Figure 17.2
Flexibility in Language

The phonemes and morphemes of the English language can be combined in countless ways to produce an almost infinite number of meaningful sentences, which we write using an alphabet of only 26 characters.

As you know, just stringing several words together does not create a sentence. To have a sentence, you must follow the rules of **grammar**—a system of rules that govern how we can combine phonemes, morphemes, and words to produce meaningful communication. Despite these elaborate rules, language can still be hopelessly, and sometimes humorously, unclear (see **Figure 17.3**). Consider the phrase "Don't threaten someone with a chainsaw." This sentence has perfect grammar, but you still can't tell which of the two possible meanings the speaker intended. (I think either interpretation constitutes good advice!)

It's important to notice that the grammar we've been talking about is not the system of rules you learn in your English or writing classes. Those classes do teach

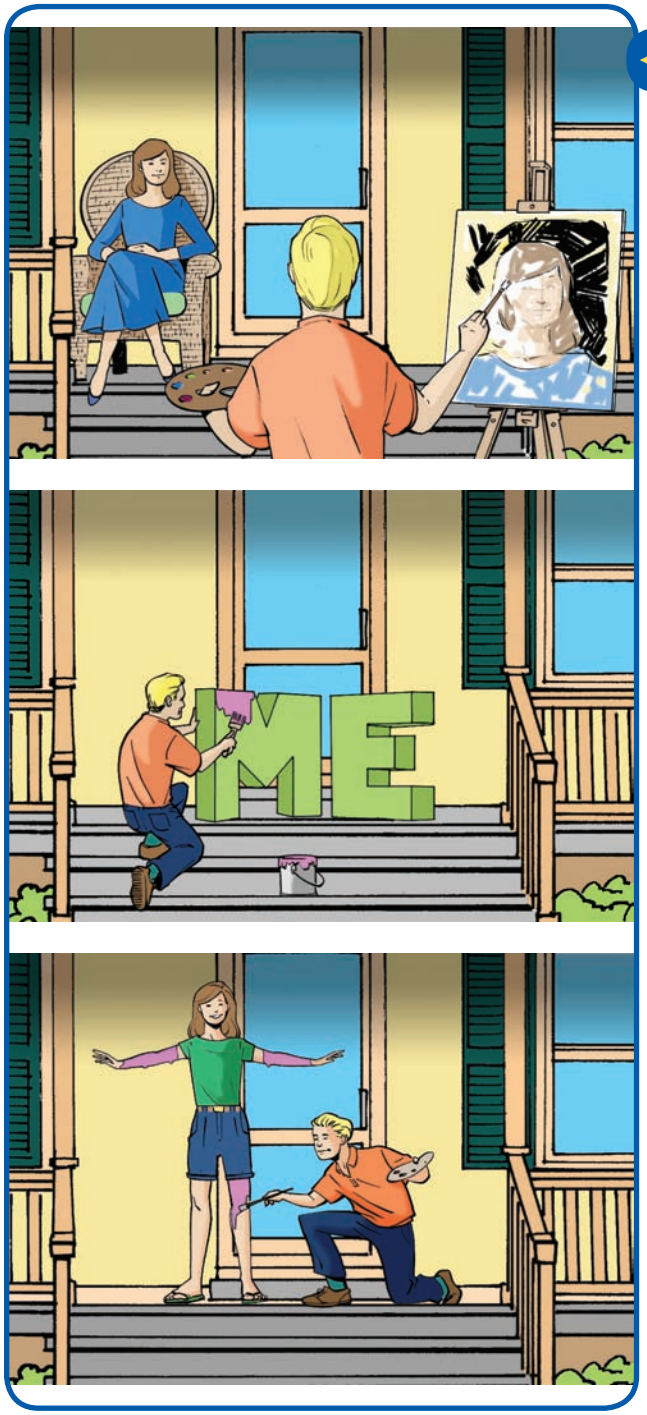


Figure 17.3
Grammar Isn't Everything

Despite being grammatically correct, this sentence is open to several interpretations: "The artist painted me on the front porch."

some rules of English grammar, but you were able to put sentences together long before you ever entered a classroom. Written language is a separate topic because it's a system by which we use symbols (in a visual representation or code) to represent spoken sounds. Even people who live in remote areas of the world with no ability to read or write use complicated grammar in their everyday speech. Such grammar, for example, has specific rules for placing adjectives (*red rose* or *rose red?*) or for indicating the status or gender of someone you are addressing (for example, you wouldn't say, "Hey, dude!" to your school principal). Grammar is part of our spoken language, and how

● Answer to the question at the start of this section: Consider how *gh* is pronounced in the word *enough,* how *o* is pronounced in the word *women,* and how *ti* is pronounced in the word *emotion.* That's right—*ghoti* is pronounced *fish!*

we learn it and everything else we call language has generated a lot of debate in psychology. You probably won't be surprised to find that the debate focuses on nature and nurture.

PAUSE NOW OR MOVE ON
Turn to page 306 to review and apply what you've learned.

Language Acquisition

WHAT'S THE POINT?

17-2 What is the evidence for each of the competing theories of language acquisition?

SASCHA SCHUERMANN/ AFP/GETTY IMAGES

NOAM CHOMSKY (1928–) Linguist who argues that children have a predisposition to learn language, as though their brains were hardwired to pick up vocabulary and rules of grammar.

Linguist **Noam Chomsky** (1959, 1987) believes that our brains are "wired" to process vocabulary and rules of grammar virtually without effort. According to this view, we have a predisposition to language—it's part of our heritage as a human species, just as flying is part of a bird's heritage. Even deaf children with no instruction in language will develop gestures to communicate and use grammatical rules to govern the use of the gestures (Sandler et al., 2005).

But is it part of our heritage to speak a *particular* language? If you are a native English speaker, imagine bending over the crib of your first-born child, putting the baby to sleep for the night. The child looks up at you, smiles sleepily, and says, "Gute Nacht," or, "Bonne nuit." Wouldn't you be amazed—perhaps even a little nervous? Babies from English-speaking homes are supposed to speak English, not some other language. Why? This is where nurture steps in. **B. F. Skinner,** famous for his studies of the effects of rewards on behavior, maintained that language learning is nothing special—we learn it just as we learn everything else. Thus, he said (1957), we learn our language through *association* (linking certain sounds with certain people or objects), *imitation* (doing what we see others doing, including their manner of speaking), and receiving (or not receiving) *rewards* (hugs, smiles, and so on).

BACHRACH/GETTY IMAGES

B. F. SKINNER (1904–1990) Psychologist who argued that children learn language through associations, imitation, and reinforcement.

Most psychologists today believe that Chomsky and Skinner were both partially right and both partially wrong. Chomsky's view that humans have a predisposition to learn language helps explain why all languages in the world have complicated sets of rules that children seem to master at amazingly young ages. Skinner's view that we learn language through association, imitation, and rewards helps explain why we speak the language we hear at home. As is the case in so much of psychology, language is neither simply nature nor simply nurture. It's both, interacting to give us a rich tool with which we communicate events, feelings, beliefs, and emotions to other humans.

Let's look now at how and when children master this wonderful tool we call language. (And also take a look at Thinking Like a Psychological Scientist: Animal Language to discover whether animals can learn human languages.)

Thinking Like a PSYCHOLOGICAL SCIENTIST

Animal Language

Do animals have language? I often sense that my golden retriever is trying to tell me something, and she often appears to understand what I tell her. Sometimes she even obeys! With enough time and effort, could we expand our communication into a full-fledged language?

Psychologists have been trying to answer this question for more than a century, most often with chimpanzees. In the 1930s, Winthrop and Luella Kellogg (1933) raised an infant chimpanzee, Gua, in their home, along with their son, Donald. They wondered whether the chimpanzee might develop language abilities if they raised it as a human. The Kelloggs did learn some interesting things from their work with Gua, but—despite eating in a high chair and wearing clothes like little Donald's—the chimpanzee never did learn to talk.

Maybe Gua didn't learn to talk because chimpanzees' vocal structure differs from that in humans. To get around this problem, later researchers, most notably Allen and Beatrix Gardner (1969), launched a project to teach chimpanzees American Sign Language (ASL), used by deaf humans. The Gardners' first student was the now-famous Washoe, who soon acquired a vocabulary of 132 signs. Roger Fouts, who, with Deborah Fouts, would later become the leading spokesperson for chimpanzees, was one of the Gardners' assistants in the late 1960s, charged with making baby Washoe's life "as stimulating and linguistic" as possible. In 1970, Washoe—and the research program that grew up around her—became Roger Fouts's primary responsibility. He and Deborah Fouts set up a program in which many of the people caring for Washoe and other chimpanzees were themselves deaf and whose first language was ASL. Washoe continued to thrive, and by the late 1990s she had increased her vocabulary to almost 200 signs (Sanz et al., 1998), where it remained until her death in 2007. She sometimes used amazing creativity to combine these signs to describe items. And perhaps most amazing of all, Washoe taught signs to her adopted son, Loulis, who picked up 55 signs while under her care. Here is a sample conversation between Loulis and his chimpanzee playmate, Dar (Fouts, 2003):

1. Loulis asked for a water balloon from Dar by holding his hand toward the balloon and signing, "Hurry, hurry."
2. When Dar moved away, Loulis signed, "Want."
3. When Dar moved away again, Loulis signed, "Hurry, hurry. Gimme."
4. Dar gave the balloon to Loulis, and the two chimpanzees separated.

Nobody doubts that these accomplishments are remarkable. The key question is, do they constitute language? The answer depends on how you define *language*. Even with a loose definition, psychologists are skeptical that any chimpanzee's communication skills can come close to matching those of a young human. One trained chimpanzee used 16 signs to ask for an orange: "Give orange me give eat orange me eat orange give me eat orange give me you" (Jolly, 1985). The idea comes across, but hardly with the type of efficiency one would hope for. A great deal of effort produces limited results with chimpanzees, whereas humans master language almost effortlessly. As amazing as these communicating chimpanzees are, their very limitations help illustrate how astounding human language ability is.

Washoe

Washoe could communicate with humans (and other chimpanzees) using a vocabulary of nearly 200 signs.

© FRIENDS OF WASHOE

PAUSE NOW OR MOVE ON

Turn to page 307 to review and apply what you've learned.

Language Stages

WHAT'S THE POINT?

17-3 What are the stages of language development?

Have you ever tried to learn a second language? If so, you're surely aware that language is immensely complicated. There's a lot of work involved, and even if you're diligent about it, progress is usually slow if you are a teenager or older. If you travel to an area where the language is spoken, you'll quickly realize that, despite your efforts, you're nowhere near fluent. The few students who do become fluent usually still have an accent unlike that of native speakers. Why does this happen? Although we have a predisposition to learn language, we only learn it easily during the early years of our childhood. Just as we go through a maturational sequence of learning how to walk, we also go through one for learning how to talk. Here are the steps involved:

1. *Babbling*—By 4 months of age, amazing human language skills are already becoming apparent. Babies are spontaneously producing phonemes and are sophisticated enough to be able to discriminate speech sounds made by others (Kuhl & Meltzoff, 1982). When babbling, children will produce phonemes they have never heard before, but within a few months they will begin to specialize in the sounds used in the languages they hear spoken. By 10 months of age, an expert can identify the language spoken in a home by merely listening to the babbling baby (de Boysson-Bardies et al., 1989).
2. *One-word stage*—About the time of their first birthday, most babies begin to use their new ability to produce sounds to communicate meaning. They start with short, one-syllable words like *ma* or *da,* and they may produce them so unreliably that other members of the family argue over whether the children are communicating intentionally. Babies' skills rapidly improve, however, and soon there is a vocabulary of single words used to describe both things *(kitty)* and actions *(swing)*. The pace at which children learn words accelerates rapidly, and by 18 months the average child is learning a new word every day.
3. *Two-word stage*—By the time most children reach their second birthday, they have entered the two-word stage. Now they are building two-word sentences. Amazingly, the way they arrange these words shows an appreciation for the grammatical rules of their native language. English-speaking children put adjectives before nouns *(big house),* but Spanish speakers put the noun first *(casa grande)*.

The two-word stage marks the end of the language stages. As **Table 17.1** indicates, after age 2, children then build on the phonemes, morphemes, words, and grammatical rules they have already mastered to develop longer and more complex sentences (Fromkin & Rodman, 1983). Their vocabulary continues to grow, too. Throughout childhood, an average person learns 5000 words a year, most outside school (Miller & Gildea, 1987). That's more than

13 words a day! By the time they hit grade school, children understand complex sentence structures. If you're average, by the time you graduate from high school, you will have a vocabulary of 60,000 words (Bloom, 2000).

As children develop their language skills, they drop interesting clues that support Chomsky's theory of language acquisition. One of the most interesting is *overgeneralization,* which occurs when children apply a grammatical rule they have learned too broadly. For example, English allows us to turn nouns into verbs. The object I use to play baseball is called a *bat,* and when I am standing at the plate I am *batting.* Once children master this principle, they sometimes apply it where they shouldn't (see **Figure 17.4**). A child who knows what a *broom* is may say he is *brooming,* rather than *sweeping,* the floor. The child has never been encouraged to use the word *brooming;* he has never even heard it before. Likewise, children will say that they *goed* to the store rather than *went* to the store. Beyond being kind of cute and amusing, this overgeneralization points to the brain's ability to soak up language rules.

Table 17.1

Stages of Language Development

Age in Months (Approximate)	Achievement
4	Babbling of many speech sounds
12	One-word expressions
24	Two-word sentences
24+	Rapid development of complete sentences

Notice again that the natural, easy learning of language applies to *spoken* language. Spoken language appeared long before written language in human history. Our brains are equipped to handle it easily, but we have not yet developed mechanisms to handle the written word as easily. We learn to speak without conscious effort as young children, yet we must go to school and work to master reading and writing. Even spoken language becomes more difficult after about age 10—when a critical developmental window seems to slam shut. In rare, tragic cases in which a child has been raised in isolation through the first decade of life, language development does not proceed normally. After this window of opportunity closes, those of us who easily

NOAM ARMONN/SHUTTERSTOCK

Figure 17.4
Overgeneralization

This 4-year-old makes mistakes by applying rules to instances that are considered exceptions in English. For example, he might tell his grandpa about how he helped his mommy "broom the floor" before they "goed to the toy store." These mistakes show he has internalized the grammatical rules of the language.

Beyond the Critical Period

We can learn language, and even more than one language, as a natural, automatic process when we are children because we are born with a predisposition to learn language. But there seems to be a catch—if we haven't learned language by the time we reach high school, the window of easy learning seems to slam shut and we have to work hard to master grammar and vocabulary. We should be offering foreign language in preschool!

RACHEL EPSTEIN/PHOTOEDIT, INC.

developed a first language must struggle to learn a second one. Knowing this, linguists often argue that it makes more sense to introduce foreign languages in preschool than in middle or high school.

PAUSE NOW OR MOVE ON

Turn to page 307 to review and apply what you've learned.

Your introductory psychology course barely scratches the surface when it comes to the wonders of human language, but one thing is certain: The course could not exist without it. The very fact that you can read about and discuss language proves its importance—which extends to every aspect of human interaction.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 17

Thinking About Language Development

Building Blocks of Language

WHAT'S THE POINT?

17-1 What are the building blocks of language?

- The basic building block of language is the phoneme, the smallest distinctive unit of sound in a spoken language.
- A morpheme is a single phoneme or a combination of phonemes and is the smallest unit that carries meaning in a language.
- Grammar is a system of rules that govern how we can combine phonemes, morphemes, and words to produce meaningful communication.

Apply What You Know

1. *I* qualifies as
   a. a phoneme.
   b. a morpheme.
   c. a word.
   d. all of the above.
2. True or False: English has more morphemes than phonemes.

Language Acquisition

WHAT'S THE POINT?

17-2 What is the evidence for each of the competing theories of language acquisition?

- Noam Chomsky believes that our brains are "wired" to process vocabulary and rules of grammar virtually without effort. Evidence for this is that all languages have complicated rules that young children are able to master.
- B. F. Skinner stated that we learn our language through association (linking certain sounds with certain objects), imitation (modeling how we see others speak), and rewards (hugs, smiles, and so on). The fact that we speak the language we hear at home is evidence of this theory.

Apply What You Know

3. _____ argued that a child will repeat a parent's words to earn the parent's praise.
4. Which of the following statements best summarizes the language-acquisition debate between behaviorists (like B. F. Skinner) and cognitive psychologists (like Noam Chomsky)?
   a. Behaviorists think language is acquired through rewards, and cognitive psychologists think the brain is wired to learn language.
   b. Language is acquired in stages according to behaviorists, but cognitive psychologists think it is acquired mostly in childhood.
   c. Cognitive psychologists emphasize how we model language use, and behaviorists look to brain research to explain language acquisition.
   d. Noam Chomsky thinks language is best learned as an adult, and B. F. Skinner thinks it's easiest to learn language as a child.

Language Stages

WHAT'S THE POINT?

17-3 What are the stages of language development?

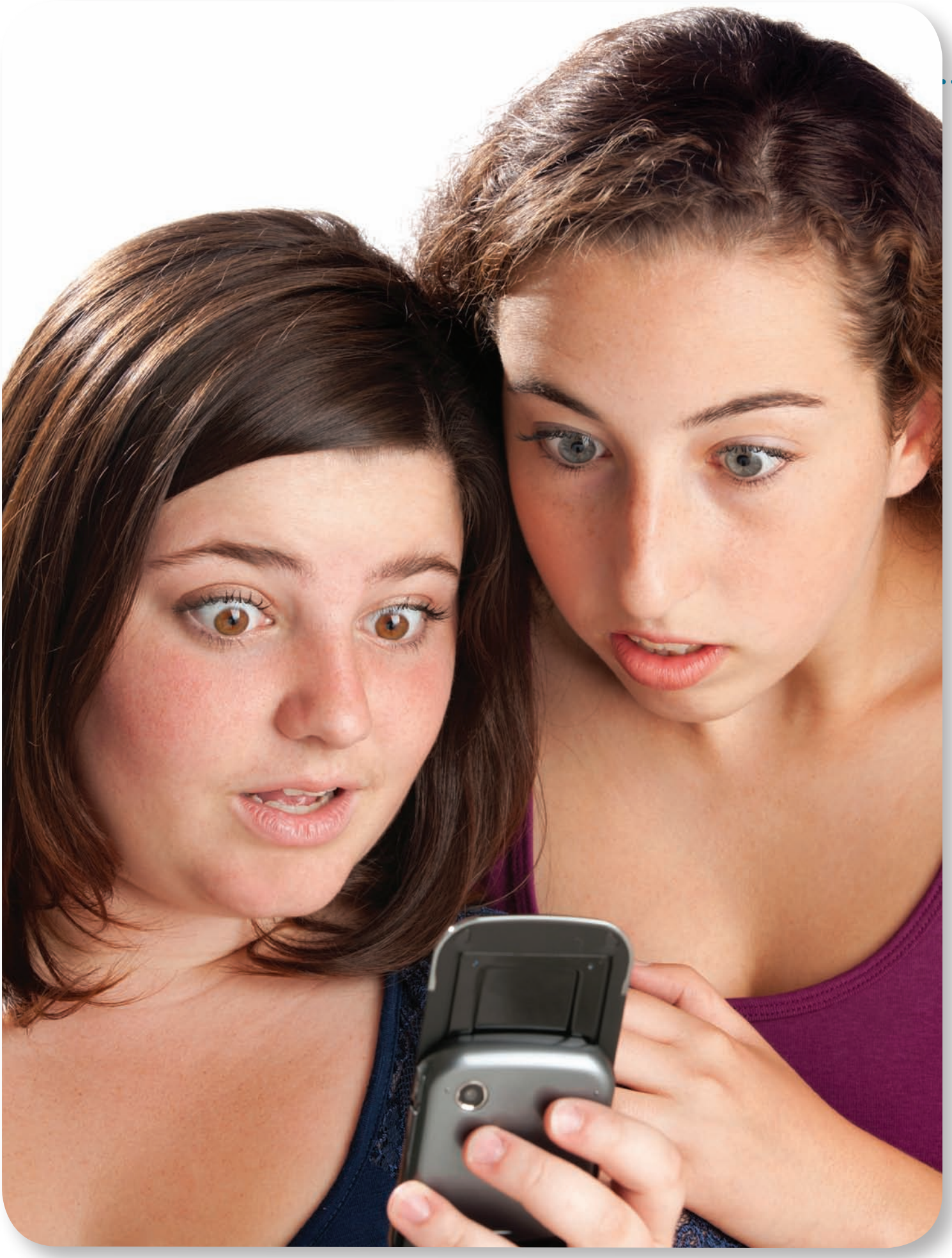
- Language develops through a series of stages: babbling, the one-word stage, and the two-word stage.

Apply What You Know

5. A young child usually enters the one-word stage at about
   a. 6 months of age.
   b. 12 months of age.
   c. 18 months of age.
   d. 24 months of age.
6. True or False: Babies babble using only the phonemes of their native language.

KEY TERMS AND KEY PEOPLE

language, p. 298
phoneme, p. 299
morpheme, p. 300
grammar, p. 300
Noam Chomsky (1928–), p. 302
B. F. Skinner (1904–1990), p. 302



DOMAIN 4

Sociocultural

Social Psychology

MODULE 18 Social Thinking and Social Influence

MODULE 19 Social Relations

Nature, Nurture, Culture, and Gender

MODULE 20 Nature and Nurture in Psychology

MODULE 21 The Psychology of Culture and Gender

Ever notice how some people act differently when circumstances change? Perhaps the football player you chat with in class is really friendly until other football players show up, causing you to think, "He's acting like he doesn't know me!" Or maybe you know a shy classmate who is constantly firing off the most aggressive, angry tweets in 140 characters or less. You wonder if the person tweeting and the person you know are one and the same.

Yes, in different situations we may very well act like different people. In the Sociocultural Domain, we explore how different aspects of your life—such as the situation you're in, the upbringing you've had, your culture, and your gender—can affect your behavior. First we turn our attention to social thinking, social influence, and social relations, going deep into an understanding of attitudes, conformity, and membership in a group. Then we turn to culture and gender, exploring how each play a significant role in determining who you are, how you think, and who you will become.

Social Psychology

MODULES

18 Social Thinking and Social Influence

19 Social Relations

Many of the topics we examine in other modules focus on humans as individuals—brain processes, sensations, perceptions, development, sleep, and so on. But no man—or woman—is an island. Each of us is a social being, influencing and being influenced by others in our world. In these next two modules, we examine some of those influences and relationships.

MODULE 18

Social Thinking and Social Influence

What social factors influence whether you say "Yes" or "No" to a request you know is wrong? Let's find out.

Each November at my school, the student council sponsors a canned-food drive for our local food bank. The drive is set up as a voluntary competition among fourth-period classes, and about half of the teachers eagerly agree to let their classes participate. Are the teachers who agree to participate more sensitive to human needs? Are they simply more competitive or more outgoing? And what of the teachers who do not participate? Were they already busy on another philanthropy project? Do they think collecting cans of food will waste valuable class time and cause too much classroom disruption? Or are they simply "not as much fun" as other teachers? Why do these teachers act so *differently,* even when they are in the same situation? Personality psychologists might answer that last question by looking at the inner, enduring elements of the teachers' personalities. However, social psychologists would be more inclined to study the social influences that help explain why people act differently in the same situation and why the same person might act differently in different situations. **Social psychology** is the scientific study of how we think about, influence, and relate to one another.

Social Thinking

- Attributing Behavior to Personal Disposition or the Situation
- Attitudes and Actions

Social Influence

- Conformity and Obedience
- Group Influence
- Our Power as Individuals

social psychology The scientific study of how we think about, influence, and relate to one another.

Canned-Food Drive

Given the opportunity to donate cans of food for the food bank, some people donate and some do not. Psychologists study why people act differently in similar situations.

MICHAEL NEWMAN/PHOTOEDIT

Social Thinking

How do we form our beliefs and attitudes about the world around us? We often do this so automatically, without conscious thought, that we're not even aware of the process. Let's slow down this process to understand how it all happens so that we can work toward fairer, more accurate attributions (that is, the way we explain events and behavior to ourselves) and attitudes.

Attributing Behavior to Personal Disposition or the Situation

WHAT'S THE POINT?

18-1 How does attribution theory predict the way we explain the behavior of others?

When we meet people, we have a tendency to analyze and categorize them based on the behaviors we observe. By now, you have decided whether your psychology teacher is reserved or spirited, straitlaced or easygoing, serious or light-hearted, and you have probably assigned, or attributed, those traits to your teacher's internal *disposition* rather than to the classroom *situation*. Have you ever considered how your teacher might act in a different situation, maybe at a party with friends or at home with family? According to **attribution theory,** we tend to explain the behavior of others as an aspect of either an internal disposition (an inner trait) or the situation (Heider, 1958). And we often make the **fundamental attribution error,** the tendency to attribute the behaviors of others to inner dispositions rather than to situations. Let's unpack those terms.

attribution theory The theory that we tend to explain the behavior of others as an aspect of either an internal disposition (an inner trait) or the situation.

fundamental attribution error The tendency to attribute the behavior of others to internal dispositions rather than to situations.

Say the person sitting next to you asks to borrow and copy your class notes. Almost automatically, you start to assign a cause, or a reason, to your classmate's request. If you think your neighbor is lazy and didn't listen, then you are making a *dispositional* attribution. If you remember your classmate was absent the day before, then you are making a *situational* attribution.

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Lazy Note-Taker or Absent From Class?

If you think your friend deserves to borrow your notes because he missed class, you've made a situational attribution for his need for notes. If you think he's lazy and didn't want to take notes, you've made a dispositional attribution.

As we try to "figure someone out," we are more likely to lean in the dispositional direction and to underestimate the situation. I sometimes make the fundamental attribution error by mentally assigning the label "shy" to students who never say a word in class. I'm often surprised when I see them transformed into loudmouths at a basketball game against an archrival, insulting the other team's players and singing "Three Blind Mice" when the referee makes a call against our team. These students behave very differently when in different situations. This means that I *underestimated* the effect of the situation and *overestimated* the effect of personal disposition. If you get cut off in traffic, are you more likely to think, "Stupid driver!" or, "That person must have a good reason for being in a hurry"? I don't know about you, but I'm more likely to make the dispositional attribution. It's hard to resist attribution errors.

In one study assessing attributions, participants talked to a woman who acted *either* warm and friendly *or* distant and critical. Half of the participants, group A, heard that the woman had been told to act one way or the other. The other half, group B, heard the woman's behavior was natural. In other words, group A was given a situational explanation of the woman's behavior, and group B was given a dispositional explanation. What effect did these explanations have on the two groups' assessment of this woman? None. If the woman acted unfriendly, *both* group A and group B labeled her as innately unfriendly. They underestimated situational factors and overestimated dispositional factors (Napolitan & Goethals, 1979).

Disposition

If Tina Fey or any famous comedian were cast as a vicious criminal in a movie, we'd probably have a hard time believing in the character. Because of the fundamental attribution error, we would assume that the role the comedian plays in public reflects her personal qualities, not the characteristics of the situation.

AP PHOTO/REED SAXON

Actors complain of being typecast, meaning that after playing a certain role for a long time, perhaps a villain in a movie, they can no longer land other kinds of parts. The problem? Directors know that viewers make attributions to actors that are hard to overcome. Daniel Radcliffe has played the role of good guy Harry Potter in eight movies, and we might have a hard time believing he could play a criminal. Therefore, we might decide not to see a movie in which he played a villainous part. Could you watch comic geniuses like Steve Carell, Ellen DeGeneres, and Tina Fey act the parts of serial murderers and find them believable? We judge actors as having a certain disposition, and in so doing, we commit the fundamental attribution error.

self-serving bias A readiness to perceive oneself favorably.

What about you? Are you shy or outgoing? In answering that question, you might say you are shy in class but not around your friends. You might say that you talk less at a big party but you could talk for hours at an overnighter with three of your close friends. When we explain our own behavior, we tend to include the situation as part of our answer. But when we explain the behavior of others, we wear blinders, attributing their behavior to their permanent, personal qualities. Interestingly, we tend to attribute the bad things we do to situations, and the good things we do to our dispositions (Malle et al., 2007).

Another common dispositional phenomenon is the **self-serving bias,** which is a readiness to perceive oneself favorably. For instance, if you blame a bad test score on the test itself instead of your preparation, it's possible that your self-serving bias is showing. Be careful, as this bias may prevent you from looking at your grade critically in such a way as to do better on your next test. That is, there is nothing you can do about a poorly constructed test, but you can certainly control your preparation.

Every day, we try to make sense of what others do or say by making attributions. Did the person at the next locker not say, "Good morning," because she is unfriendly or because she's exhausted from staying up late studying for her history exam? Does the college admissions counselor look at your transcript, see a low grade in chemistry, and think you don't care about science? Or does the same admissions person look at the rest of the semester to see whether the courses you took were particularly challenging that term? Sit on a jury, and you may have to decide whether someone acted in self-defense or is aggressive by nature and should be put behind bars. The point is, these judgments or attributions matter, and whether we make the judgments based on the person or the situation also matters (Fincham & Bradbury, 1993). A wife says to her husband, "Must you always spend so much money?" In happy marriages, the husband will attribute this statement to something situational, like a bad day at the office. In an unhappy marriage, the husband is more likely to attribute the statement to disposition, perhaps thinking, "I wish she wasn't so stingy" (Fletcher et al., 1990).

Are there political implications for attributions? You bet. Several researchers (Furnham, 1982; Pandey et al., 1982; Wagstaff, 1982; Zucker & Weiner, 1993) have shown that political liberals tend to explain social problems, such as poverty and unemployment, as a result of the situation. Conservatives are more likely to cite personal dispositions of the unemployed and poor. The liberal might ask, "If you could not get a good education, had to face discrimination, and lived in a poor neighborhood, would you be any better off than the poorer people in your city?" The conservative's response is likely to be something like "The poor who work hard enough will pull themselves out of poverty. People pretty much get what they deserve." Social scientists are more likely to blame present and past situations, not disposition.

Culture also affects attribution. Several banks and investment firms lost millions of dollars in the 1990s when employees made unauthorized transactions. Why did these financial institutions lose money? In the United States, we tended to blame unethical individuals—a dispositional attribution. In Japan, newspapers blamed a lack of organizational controls—a situational attribution (Menon et al., 1999). Research shows that people raised in Western countries like the United States tend to make attributions based on dispositions far more often than those from East Asian cultures (Masuda & Kitayama, 2005).

PEANUTS

WHY ARE YOU ALWAYS SO ANXIOUS TO CRITICIZE ME?
© 1989 United Feature Syndicate, Inc.
I JUST THINK I HAVE A KNACK FOR SEEING OTHER PEOPLE'S FAULTS..
4-25
WHAT ABOUT YOUR OWN FAULTS?
I HAVE A KNACK FOR OVERLOOKING THEM..
SCHULZ

PEANUTS REPRINTED BY PERMISSION OF UFS, INC.

Negative behavior
Someone cuts into the line in front of you.

Situational attribution
"That tired mother is so busy with her little boy, she didn't even notice me in the line."

Tolerant reaction

Dispositional attribution
"Who does that lady think she is? I bet she always cuts in front of people in lines."

Unfavorable reaction

Figure 18.1
Negative Behavior: Cutting in Line

Whether you tolerate a negative behavior or respond unfavorably to it will depend partly on how you interpret the event.

It may be impossible to identify all attribution errors we make in a given week or day. What is possible, however, is to realize that our attributions about others—our judgments about whether their behavior is caused by situational or personal factors—carry lasting consequences (see **Figure 18.1**).

PAUSE NOW OR MOVE ON

Turn to page 332 to review and apply what you've learned.

Attitudes and Actions

WHAT'S THE POINT?

18-2 How can attitudes affect actions? And how can actions affect attitudes?

A friend tells you Mr. Doane is mean and grades unfairly. Although you may never take a class with this teacher, your friend's assessment could affect your **attitude**—a belief and feeling that predisposes you to respond in a particular

attitude The belief and feeling that predisposes someone to respond in a particular way to objects, people, and events.

way to people, events, and objects. You may develop a feeling of dislike for this teacher and perhaps even respond in an unfriendly way if he ever requested anything from you. Attitudes have a powerful effect on behavior.

The Effects of Attitudes on Actions Several studies have shown that attitudes and behaviors are not always perfect matches (Wicker, 1971). The same students who say they're against cheating may later look at someone's paper for an answer. The people who claim to treat all people equally may behave differently toward members of another race or ethnic group. Why do we sometimes talk one way but act another? Do attitudes ever predict behavior?

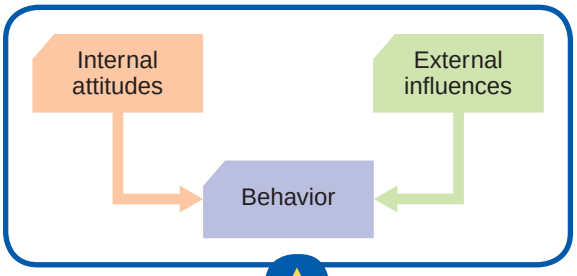


Figure 18.2
Behavioral Influences
External influences and internal attitudes affect behavior.

Some studies (Kraus, 1991; Wallace et al., 1996) show that our attitudes can predict behavior, if the circumstances are right (see **Figure 18.2**). Sometimes we *do* talk the talk *and* walk the walk—but only in the following cases:

1. *The outside influences on what we do are minimal.* Perhaps your friend Matt swore in seventh grade that he would never smoke. Several years later, most members of Matt's new peer group are smokers. Giving in to this increased outside pressure, Matt starts to light up. Had the outside influences remained minimal, his attitude toward smoking would have had a better chance of remaining the same as it was in seventh grade.
2. *We are keenly aware of our attitudes.* When we are conscious of what we believe, our behavior is more likely to match our beliefs (Fazio, 1990). If something had made Matt fully aware of his seventh-grade attitude about smoking, then he might never have started smoking.
3. *The attitudes are relevant to the behavior.* If you say you believe exercise is essential for good health but you really dislike getting sweaty, then you may avoid working out even though you know it's good for you. Your attitude toward exercise will guide your physical fitness program.

The Effects of Actions on Attitudes But behavior can also affect attitudes. The concepts of foot-in-the-door phenomenon, role-playing, and cognitive dissonance help us understand how behavior often precedes and fosters attitudes.

FOOT-IN-THE-DOOR PHENOMENON A student group at our school was trying to raise money for the Make-A-Wish Foundation. The highest amount our school had raised in previous years was $800. In planning the fund raiser, the students made a series of requests from the administration. First they asked, "If we raise $500, can we print the names of the top five donors in the daily bulletin?" The answer was "Yes." Then, "If we raise $1000, can we print the names of the top five donors and give them a free school lunch for a week?" The answer? "Yes."

Requests for rewards for increasing amounts of money continued until the students asked, "If we raise $5000 [an unheard-of amount], would you release school an hour early the last Friday of the fund raiser?" The administration

approved the early dismissal, and the publicity machine for this event shifted into high gear.

Posters declaring this ultimate incentive were distributed to every classroom. At the end of two weeks, our school presented a check for more than $7000 to the Make-A-Wish Foundation. Everybody (except the teachers) started the weekend an hour early. It's amazing what students will do for an extra hour off, isn't it?

One of the students who made the requests of the administration later admitted to having read about the **foot-in-the-door phenomenon** in psychology class. This phenomenon is the tendency for people who have first agreed to a small request to comply later with a larger request. One researcher (Cialdini, 1993) found that if you want people to agree to something big, then you should start small and work your way up. The escalating actions fuel the attitudes, and each successive act is easier to agree to. Would you put a large, ugly "Drive Carefully" sign in your front yard? One study found that only 17 percent of the people in a California neighborhood would agree to post such a sign. However, when this request was made two weeks after people had agreed to display a small, 3-inch-high "Be a Safe Driver" sign, a whopping 76 percent allowed the large, unsightly sign in their yard (Freedman & Fraser, 1966).

So, were the students running the fund drive for the Make-A-Wish Foundation smart to start with the small requests? Would the principal have agreed to the hour off from school if it had been the first request? What do you think?

MICHEL TOURAINE/PIXLAND/CORBIS

Foot In or Out of the Door?

Using their understanding of the foot-in-the-door phenomenon, these students were able to leave school an hour early.

ROLE-PLAYING When you go to college, you'll be taking on a new **role.** We think of a role as a set of expectations in a social setting that defines how one ought to behave. At first, it may feel a little weird, as if you're "playing college" as you adjust to professors who don't take attendance and truly don't want to know when you use the restroom. You may at first feel strange about attending fewer classes each day, but before long, your actions will no longer seem so artificial. You'll not only *act* like a college student, you'll *feel* like

PHILIP G. ZIMBARDO, PH.D., STANFORD UNIVERSITY

Role-Playing Prison Guards

Philip Zimbardo had to call off his prison study after the role-playing became too intense (see the next page).

foot-in-the-door phenomenon The tendency for people who have first agreed to a small request to comply later with a larger request.

role A set of expectations in a social setting that define how one ought to behave.

Thinking About POSITIVE PSYCHOLOGY

Harvesting Heroism

Gabrielle Giffords had already been shot.

Nineteen more people, standing outside the Arizona Safeway grocery store where Congresswoman Giffords was hosting a public event, would also wind up wounded or killed by the gunman.

In the midst of the chaos, 61-year-old Patricia Maisch, who'd been waiting to get her picture taken with Giffords, dropped to the ground because she thought running would make her a target. Out of bullets, the gunman started to reload.

Suddenly, someone hit the gunman with a folding chair, and wounded retired army colonel Bill Badger and others knocked him down. Maisch heard someone say, "Get the gun."

"The gun was in his right hand," said Maisch, "It was just out of reach, but I saw he was using his left hand to get a second clip out of his pocket to reload. I grabbed the clip" (*Australian,* 2011).

"This is one of the most heroic acts I've ever seen," said Arizona Sheriff Clarence Dupnik. "For whatever reason, she [Maisch] decided something had to be done" (Berger, 2011).

Psychologist Phillip Zimbardo would agree with Sheriff Dupnik that Maisch was a hero who saved lives. Acting to disarm a gunman is extraordinarily heroic.

PHOTO BY *NY DAILY NEWS* VIA GETTY IMAGES

A True Hero

Patricia Maisch grabbed an assassin's bullets and saved lives.

But Zimbardo also believes we must get beyond our traditional notion of heroes as larger-than-life figures if we want to increase the number of heroic acts in our society (2010b). The goal should be to create everyday heroes.

> Most people who do heroic deeds, ordinary people, typically do a single heroic deed only once because to be a hero you need an opportunity. . . . What I'm trying to do is promote the notion that any of us could be a hero if we are willing to act on behalf of other people in one. What we do, we eventually become. Several studies have confirmed this effect, including the Zimbardo prison study.

PHILIP G. ZIMBARDO, INC.

PHILIP ZIMBARDO (1933–) American psychologist whose research focuses on heroism, cult behavior, and shyness. He is most famous for the Stanford Prison Study.

Psychologist **Philip Zimbardo** (1972) randomly assigned a group of Stanford University students to play the part of either a guard or a prisoner in a simulated prison. Although the study was designed to last much longer, it ended after only six days. Why? Zimbardo called it off because the students playing guards were displaying humiliating aggressiveness and cruelty toward the students playing the prisoner role. Both guards and prisoners had adopted uncharacteristic roles, and both were becoming the characters they were playing. Behavior can shape beliefs and attitudes.

Psychologists note, however, that in atrocity-producing situations like Zimbardo's prison study, not everybody gives in to the power of the situation (Franco & Zimbardo, 2007; Haslam & Reicher, 2007). Zimbardo's recent work centers on the "hero in waiting" that he contends is in each one of us (see Thinking About Positive Psychology: Harvesting Heroism).

need or a moral cause, knowing that there is potential personal cost. (Zimbardo in Donati, 2010)

This cost, says Zimbardo, could be ridicule or even personal harm.

Zimbardo started the Heroic Imagination Project (or HIP, found at http://heroicimagination.org) with the aim to increase civil acts—in other words, to increase everyday heroism. Those involved in HIP learn three fundamental points:

1. You don't have to fight to be a hero; you can be a peace hero.
2. Heroic acts need not be extraordinary. Rather, they can be acts that are performed every day because our society needs and expects these acts.
3. Anyone can be a hero.

So, how do we foster everyday heroism? It starts with a commitment to the belief that everyone is a "hero in waiting" and that we all have the potential to act heroically when the situation demands it. Zimbardo identifies small acts (such as being willing to ask for help or complimenting others on things they've done well) as examples of nondramatic heroism. The next step, particularly with students your age, is to nurture heroic imaginations (Donati, 2010):

1. Encourage people to recognize when others need help. Recognizing that things are odd, out of place, or not quite right can be the trigger that gets you to defuse danger before it explodes. For example, realizing someone is about to bully a classmate is necessary before you can take action to stop the bully.
2. Encourage and expect action over inaction. When parents, friends, or teachers discuss situations that might require intervention, and indicate intervention as the expectation, the likelihood of everyday heroism increases. Don't just stand around watching a bully harm a classmate.
3. Teach or model ways for students or classmates to resolve conflicts. It's far more heroic to talk through a problem than to fight over it.

Zimbardo concludes that "what the world needs now is more heroes." He hopes that more of us will "learn to become wise and effective heroes who can change the world, one positive step at time" (Zimbardo, 2010a). Patricia Maisch's brave act in Tucson and the small but significant decisions that you can make today are both examples of choosing courage when heroic opportunities arise.

COGNITIVE DISSONANCE A former student, J.J., who vocally supported politically liberal causes, fell head over heels for an officer in the Teenage Republicans club. At her request, J.J. joined the Teenage Republicans and started attending meetings. After joining, he began to feel a sort of tension between his liberal beliefs and his actions supporting the conservative club. Then J.J. noticed that his attitudes were changing from negative to positive toward the club's conservative projects. Why did J.J.'s attitudes change? According to **cognitive dissonance theory,** we act to reduce the discomfort (dissonance) we feel when our thoughts (cognitions) and actions are inconsistent. When his attitudes and actions clashed, J.J. reduced the resulting dissonance by changing his attitudes (see **Figure 18.3**).

cognitive dissonance theory The theory that we act to reduce the discomfort (dissonance) we feel when two of our thoughts (cognitions) are inconsistent.

Research regarding the war in Iraq provides an international example of cognitive dissonance. Before the war began in 2003, 80 percent of the people in our country believed weapons of mass destruction (WMD) would be found in Iraq and that this justified an overthrow of its leader, Saddam

Figure 18.3
Cognitive Dissonance in Action

When two thoughts are incompatible, we often reduce the discomfort (dissonance) by changing an attitude.

J.J.'s attitude
"My political beliefs are liberal."

J.J.'s behavior
J.J. joins the Teenage Republicans because his girlfriend is an officer.

Cognitive dissonance
(awareness that attitude and behavior are inconsistent)

Dissonance resolved
"Maybe the conservatives have a point."

Hussein (Duffy, 2003). At that time, only 38 percent of our population believed war was justified even if Saddam did not have WMD (Gallup Organization, 2003). That is, 62 percent of Americans did not believe going to war with Iraq was justified if Saddam did not have such weapons. When no WMD were found, dissonance occurred. Because dissonance is uncomfortable, some people reduced their dissonance by changing the primary reason in their minds for going to war from getting rid of Iraq's WMD to liberating Iraqis from Saddam's regime. The number of Americans believing war was justified without WMD shot from 38 percent to 58 percent (Gallup Organization, 2003). When hopes dimmed of bringing relatively quick and easy peace to the region, support for the war dropped below 40 percent (Gallup Organization, 2006).

So, we can see through the foot-in-the-door phenomenon, role-playing, and cognitive dissonance that attitudes can follow behaviors. We can apply this principle to our advantage. If we have an attitude we'd like to change, such as negative feelings toward people from different social groups, then we can start by changing our behavior toward those individuals. In clinical settings, cognitive behavior therapists use this principle for the benefit of their patients—for example, by encouraging patients with depression to talk more positively and to avoid putting themselves down (Seligman, 2002). Therapists hope that these more positive behaviors will help change their patients' attitudes about themselves.

Figure 18.4
Attitudes and Behaviors Go Hand in Hand

Helping someone, even after knocking him over, promotes respect. Respect promotes positive behavior.

Social psychologists study not only the interesting ways in which we are affected by our own attitudes and actions but also the ways in which we are affected by the attitudes and actions of those around us (see **Figure 18.4**).

Social Influence

Do other people influence us? You bet! Consider these scenarios:

- The person next to you in class yawns. Then the person in front of you yawns. Within seconds, you are fighting the urge to follow suit. Even more interesting is the fact that the better you are at understanding someone's emotions (your empathic skills), the greater your likelihood of yawning (Morrison, 2007).
- A group of five students stands outside the front door of a building. For no good reason, they start to look up. As long as the five are out there, almost everybody approaching the building looks up as they enter, even though there is nothing special to see.
- In the 8 days following a murderous shooting spree in a Colorado high school, 49 states report copycat threats. Pennsylvania led the way with 60 threats (Cooper, 1999).
- Over a brief stretch of 18 days, a school with 1500 students reports 2 suicides, 7 attempted suicides, and 23 students contemplating suicide (Cooper, 1999).
- Defendants standing trial for Nazi war crimes, participants in the Holocaust that brought death to more than 6 million Jews, are asked why they took part in these murders. Many, including Adolf Eichmann, the Nazi director of deportation of Jews to concentration

camps, respond by saying, "I was only following orders" (Goldensohn, 2004).

There is no denying the titanic power of social influence on our actions and attitudes. Advertisers use it to sell products, and politicians use it to win votes. But in *tragic and violent* instances, such as the suicide clusters, school shootings, and genocide, what is the role of social influence? In search of answers, social psychologists have studied both conformity and obedience.

PAUSE NOW OR MOVE ON

Turn to page 332 to review and apply what you've learned.

Conformity and Obedience

WHAT'S THE POINT?

18-3 What does research say about conformity and obedience?

Suppose you have a test scheduled for Friday in your psychology class. In preparation, you study hard in the evenings leading up to the test. Then on Thursday, a classmate asks that the test be moved to Monday. You sense a wave of support for this request as other class members voice their agreement. But you don't think it is such a good idea. You have a marching band trip planned for the weekend and you'll arrive home late Sunday night, exhausted from the travel and hectic schedule. A Monday morning exam is not what you need. The teacher says the test will be moved to Monday if *every* member of the class votes in favor of the move. When the vote is called for, every hand in the class goes up except yours. Your vote will make the difference. What will you do? Will you vote your beliefs or *conform* to the class's desire to delay?

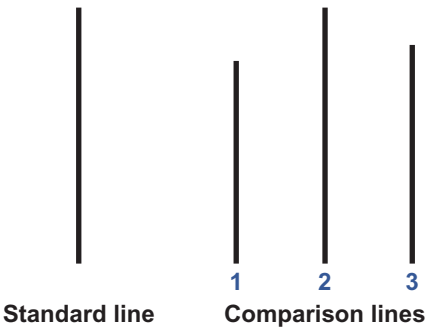
SOLOMON ASCH CENTER FOR STUDY OF ETHNOPOLITICAL CONFLICT

SOLOMON ASCH (1907–1996) Social psychologist who researched the circumstances under which people conform.

Conformity is adjusting behavior or thinking to coincide with a group idea or standard. Under what conditions is conformity likely to occur? Social psychologists have been asking—and answering—that question since the mid-twentieth century. **Solomon Asch** (1955) conducted one of the more ingenious conformity studies. To get a feel for how this experiment worked, you're going to have to use your imagination.

So, you're a college student, and you've signed up to participate in a study on perceptual judgment. Arriving at the experiment's location, you are assigned seat 6 (out of 7), and you sit down around a large table with six others. You're told you will be shown sets of cards, and your task is to identify which of the three lines on card B is identical to the one line on card A (see **Figure 18.5**). The first set is displayed. Clearly, the answer is line 2. One by one, every participant in the room agrees. The experimenter records your answers one at a time and then puts up the second set of cards. You think to yourself, "This is easy." Again, you all agree on the same lines. Then comes the third trial, which appears to be just as easy as the first two. You're

conformity Adjusting behavior or thinking to coincide with a group standard.



WILLIAM VANDIVERT/SCIENTIFIC AMERICAN

Figure 18.5
Conformity

Which comparison line is closest in length to the standard line? What would you say if you were in a room with several others who all said line 1 was closest? Asch found that many people conformed, agreeing to the wrong answer. Not conforming led to considerable stress, as is evident here in the subject in the middle.

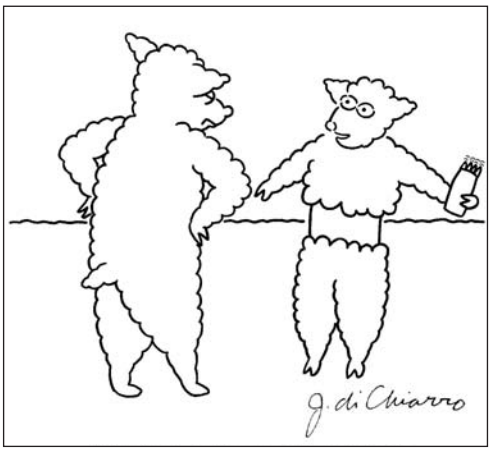
ready to say, "Line 2," but to your surprise, the first person gives an answer you think is clearly wrong. Your amazement continues as all five people in front of you choose the wrong line! Now it's your turn, and you must give an answer. What you don't know is that everyone else in the room *is in on* the experiment. They've all been instructed to lie during the third trial. You, the person in seat 6, are the only participant. What will you say when it is your turn? Will you go along with the majority, or will you trust your judgment and remain true to yourself?

Asch found that if nobody else was in the room, then participants made mistakes on the third trial about 1 percent of the time. However, if the five other people gave a wrong answer before the participant replied, then participants gave the same wrong answer about 33 percent of the time. In essence, roughly one-third were willing to say that up was down to conform to the group.

An interesting follow-up to Asch's study assessed the role of judgment difficulty on conformity (Baron et al., 1996). Picking the longest line out of three is pretty easy, especially when you can stare at it for several minutes. But what about picking a stranger out of a lineup when you have had only a brief look at the person you're supposed to identify? In one study, researchers showed participants two slides. The first showed the man they were to identify, and the second showed a four-man lineup. Participants viewed slide 1 for either 5 seconds (making the decision easy) or half a second (making the decision more difficult). Then they tried to select the correct person in slide 2. Also, half the group was told their judgments were unimportant (that this was simply some preliminary testing) or important (that norms for actual police procedure were being developed and the person making the most accurate identifications would receive $20). Researchers found that when judgments were easy and were deemed *un*important, fewer than 20 percent conformed to the judgments of the other participants. But more than 50 percent conformed to others' judgment when the task was labeled important and difficult. It appears that if being correct matters and we're unsure of our answer, then we are open to the opinions of others.

Other studies have shown that conformity tends to increase when

- you feel incompetent or insecure.
- you are in a group of three or more. (Groups larger than three show no additional conformity.)



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"But Mom, all the girls are doing it."

- the rest of the group is unanimous.
- you are impressed by the status of the group.
- you have made no prior commitment to a response.
- you are being observed by others in the group.
- your culture strongly encourages respect for social standards.

Our perception of whether social influence is good or bad is directly related to our beliefs. If social influence supports an ideal we oppose, then we might be inclined to complain about weak-minded conformists who can't think for themselves. But be careful of the double standard: What if social influence supports an ideal we favor? Do we suddenly think of conformists as forward thinking, responsive, and intellectual? Our view of conformity often reflects our values.

Use your imagination one more time. This time, you're going to become a participant in what may be social psychology's most famous and most controversial study.

What would you do in the following situation? You and another person show up to participate in a study. The experimenter, wearing a lab coat and carrying a clipboard, greets you and explains that this is a study of the effects of punishment on learning. You and the other participant, Mr. Wallace, draw slips of paper to see who will be the learner and who will be the teacher. Your slip says, "Teacher." As the teacher, you must punish Mr. Wallace with an electric shock every time he makes an error on the learning task.

You then help the experimenter strap Mr. Wallace into a chair in the learner's room and attach electrodes to his skin. The experimenter uses electrode paste, he explains, to avoid burns and blisters. The experimenter also says that the electric shocks to Mr. Wallace may cause extreme pain but they should not result in "permanent tissue damage" (Milgram, 1974, p. 19). You are given a sample of the shock Mr. Wallace will receive if he makes a mistake, and it hurts.

Next, you take your seat in the teacher's room. You can't see Mr. Wallace, but you can hear him and talk to him. In front of you is an eerie-looking machine that will send the shocks to Mr. Wallace following an incorrect answer. The machine has 30 switches, each with a label indicating the number of volts that will be delivered for increasing levels of shock. You are told to deliver a "slight" shock (15 volts) for the first mistake and then to increase the voltage each time Mr. Wallace makes an error. Above the 150-volt switch, it says, "Strong Shock." The message above the 375-volt switch reads, "Danger: Severe Shock." Above the last switch, 450 volts, it simply says, "XXX."

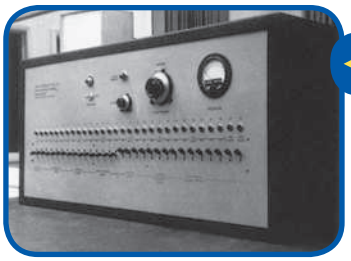
You are told to begin. Mr. Wallace makes a mistake, you flip the little black switch, and a buzzing sound fills the air. But Mr. Wallace continues to make mistakes. After you throw the tenth switch, Mr. Wallace shouts, "Get me out of here! I won't be in the experiment anymore! I refuse to go on!" You look at the experimenter, who says, "Please continue." You express concern, and the experimenter says, "The experiment requires you to continue." You protest, but the experimenter says, "It is absolutely essential that you continue."

What would you do? Would you stop? Continue? If you obey the experimenter, the learner will start yelling, obviously in agony with the increasingly painful shocks. In the experiment, the teacher continues, and at the 330-volt mark, the learner refuses to answer. He is now screaming in pain at the shocks he is receiving. Eventually, there is only silence from Mr. Wallace.

Mr. Wallace: Learner

In Stanley Milgram's experiment on obedience, researchers attached electrodes to the "learner's" body. He was to be "shocked" every time he made a mistake.

© 1965 BY STANLEY MILGRAM. FROM THE FILM *OBEDIENCE*, DISTRIBUTED BY PENN STATE MEDIA SALES



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Milgram's Teaching Machine

Voltage appeared to range from 15 to 450 volts.

STANLEY MILGRAM (1933–1984) Social psychologist who researched obedience to authority.

The experimenter explains that silence is considered a wrong answer and the teacher should deliver the shocks all the way to the 450-volt switch.

Perhaps you've guessed by now that this experiment had nothing to do with learning. The "learner" was an actor with a script, and he never received a shock. The researcher, **Stanley Milgram,** wanted to know how far the "teachers" would go—how much shock they would deliver to another person because they had been told to do so.

How far would you have gone as the teacher? Milgram asked dozens of psychiatrists and psychologists to predict the results of his experiment. They all agreed that there was only a remote possibility that anyone would go all the way to 450 volts. Only sadists, those fringe members of society who enjoy inflicting pain, would inflict such severe shocks on a learner.

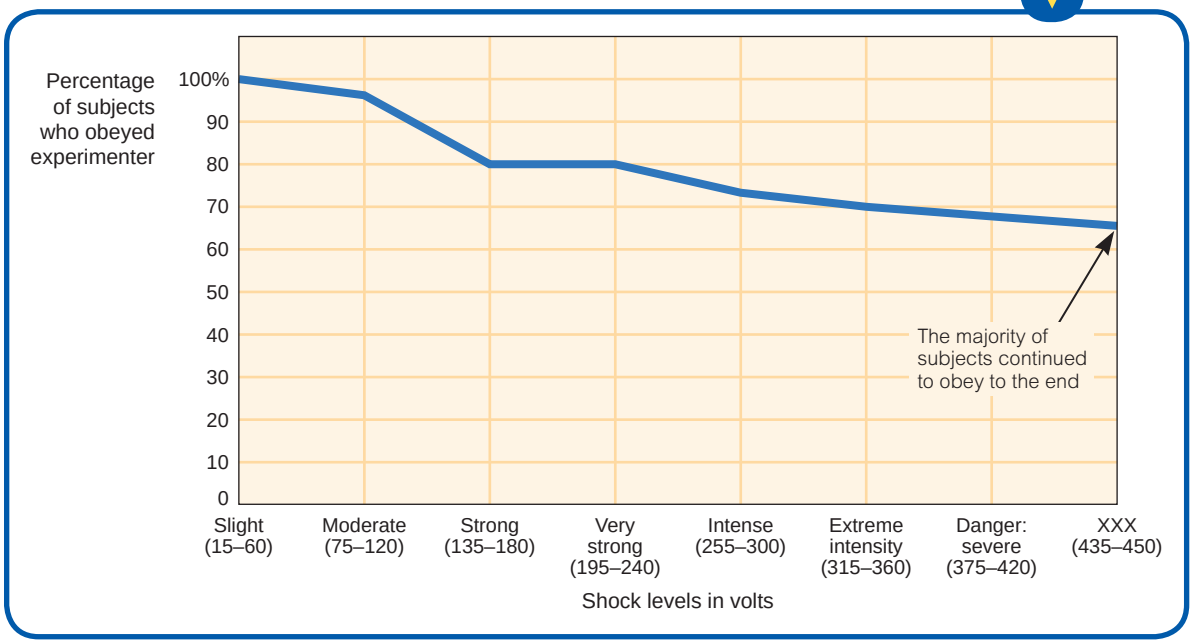
obedience The tendency to comply with orders, implied or real, from someone perceived as an authority.

All the experts were wrong. Milgram found that an incredible 63 percent of the participants (all men) obeyed instructions, flipping all 30 switches (see **Figure 18.6**). Follow-up studies showed that women complied at a similar rate (Blass, 1999). Had the participants figured out that the learner was not really receiving shock? *No.* Videotapes showed the nervous teachers, biting their lips, trembling, and drenched in sweat.

Milgram ran several versions of this experiment and found that the likelihood of **obedience** increased when the victim could not be seen, the authority figure giving the orders was close at hand, and the authority figure was part of a prestigious organization or institution. Obedience decreased if participants could observe a defiant role model.

Figure 18.6
Shocking Results

About two-thirds of Milgram's participants obeyed the experimenter to the fullest extent. (Data from Milgram, 1974.)



Milgram's obedience experiment provoked a debate over research ethics. The American Psychological Association's *Ethical Principles of Psychologists and Code of Conduct,* developed after Milgram conducted his research, prohibits studies that stress participants as Milgram's did. Yes, the researchers debriefed the "teachers" after the experiment was over, and they all were able to see that Mr. Wallace had not been hurt. But 63 percent of those teachers had walked out of the laboratory thinking they had just shocked someone into silence. Milgram was concerned about the aftereffects on participants (Blass, 1996). He identified 40 teachers who had seemed most agonized and arranged for them to be interviewed by a psychiatrist. None of them appeared to be suffering emotionally.

Experiments similar to Milgram's studies would not be allowed today, although a re-creation using virtual reality was recently conducted. Participants had to shock a virtual (and clearly nonhuman) woman on a TV screen. These participants responded similarly to those in the original study, experiencing the same racing heart and perspiration (Slater et al., 2006).

What can we learn from Milgram's work? The lesson is not simply whether we should shock people to help them learn. Milgram, like most researchers, was not trying to re-create real-life behaviors in his laboratory. Rather, he was interested in the underlying thought processes that mold behaviors.

The lesson Milgram wanted us to carry away was that ordinary people can be corrupted by an evil situation. Despite the predictions of behavior experts, normal, everyday, well-adjusted men and women were willing to follow orders and severely punish another human being for making a mistake. Soldiers also may follow orders and shoot unarmed civilians. Ordinary students who plan and carry out cruel initiation practices into clubs or other groups, using "tradition" as a lame justification, embark on a similar path. Milgram said, in summarizing his findings, "The fundamental lesson of our study is that ordinary people, simply doing their jobs, and without any particular hostility on their part, can become agents in a terrible destructive process" (1974, p. 6). This is a vivid lesson in the power of the situation. Situational factors, such as the presence of an authority figure, have far more influence on our behavior than most of us realize.

PAUSE NOW OR MOVE ON

Turn to page 333 to review and apply what you've learned.

Group Influence

WHAT'S THE POINT?

18-4 How does being around others affect our behavior, and how does group membership affect our thinking and decision making?

Have you ever had a friend who was friendly enough when no one else was around but ignored you when other people were present? Does your behavior change when you're in a group of friends? When you're playing

sports? When you're with your family? When you're around teachers or the principal? Social psychologists are interested in how we behave in small and large groups.

social facilitation Improved performance on tasks in the presence of others.

Our Behavior in the Presence of Others

A track coach once told me the fastest times in both the short- and long-distance races were always turned in during the track meets with lots of fans, not during practice. Research supports the track coach's statement. Our behavior changes noticeably (although not always for the better) in the presence of others.

SOCIAL FACILITATION

The improved performance on tasks in the presence of others is called **social facilitation.** Some studies supporting social facilitation were done more than a century ago. One researcher discovered that cyclists scored faster times when racing one another than when simply racing the clock (Triplett, 1898). The same researcher asked a different set of participants to reel in a fishing line as fast as possible. These "fastest" times were bettered when the same people reeled in the same fishing line in the presence of another person reeling in line.

Both of these tasks are relatively easy. Later research has demonstrated that social facilitation is at its best with simple or well-learned tasks. Being watched increases our arousal. Arousal strengthens our ability to perform well-learned tasks, but it diminishes our performance on tasks we have not yet mastered. This was illustrated in a study of pool players (Michaels et al., 1982). Master pool players made 71 percent of their shots when alone but upped that score to 80 percent when four people observed them play. Not-so-good pool players made 36 percent of their shots with nobody watching but only 25 percent in the presence of others. Research supports the notion that the social facilitation effect is a sword with two sides (Guerin, 1986; Zajonc, 1965). Tasks we find difficult may seem impossible with an audience watching. But give us an audience for the things we do well—especially a supportive audience—and we're likely to do even better. Does this mean there's a home-field advantage in sports? To a degree, *Yes* (see **Table 18.1**). Social facilitation helps explain this advantage.

Table 18.1

Home-Field Advantage in Major Team Sports

Sport	Games Studied	Home Team Winning Percentage
Baseball	23,034	53.5%
Football	2,592	57.3
Ice hockey	4,322	61.1
Basketball	13,596	64.4
Soccer	37,202	69.0

Source: From Courneya and Carron (1992).

social loafing The tendency for people in a group to exert less effort when pooling their efforts toward attaining a common goal than when individually accountable.

deindividuation The loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity.

Running Faster

Social facilitation theory predicts faster races with an audience present.

AP PHOTO/DAVID J. PHILLIP

Social Loafing?

In small groups, some people often do less work than others. Social loafing may happen because people feel less responsible or simply because they feel their help is not really needed.

© IAN SHAW/ALAMY

SOCIAL LOAFING Do we always try to do our best in the presence of others? Maybe not. Have you ever been asked by a teacher to work on a group project? Suppose you're put in a group of five and your project will be given one grade. All group members will receive the same grade, regardless of how much work they put in. What usually happens in this situation? If your experience is anything like mine, a couple of people usually end up doing most of the work. Social psychologists call this **social loafing,** the tendency for individuals in a group to exert themselves less when pooling their efforts toward attaining a common goal than when individually accountable. Several studies have illustrated this tendency. In one, researchers blindfolded students, handed them a rope, and asked them to pull as hard as they possibly could (Ingham et al., 1974). When the blindfolded students thought three others were behind them pulling, their "best" pulling efforts dropped by almost 20 percent, compared with earlier measures of their individual ability.

Why does social loafing occur? Perhaps it's because people working in a group feel less accountable for the result. With less accountability comes less worry about what others think. Or perhaps social loafers think their efforts are simply not necessary (Harkins & Szymanski, 1989; Kerr & Bruun, 1983). Whether it's in the classroom or in business, when group members know they will receive an equal share of group benefits, slackers, in the form of social loafers, are likely to emerge.

DEINDIVIDUATION Social facilitation increases physiological arousal. Social loafing decreases the sense of responsibility. What happens when people are in a group and they become aroused *and* lose their sense of responsibility? Social psychologists might predict that the combination would increase the chances of **deindividuation**—the loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity. Examples

of deindividuation are easy to find, and they make the news when taken to an extreme. A few years back at the end of a National Football League season, Cleveland fans covered one end of the field with beer bottles when they thought a referee's call cost them the game. Sports fans often yell things during a game that they would never yell if they were alone in the stands and easily identified. Store lootings during riots are another example of deindividuation. The less restrained and self-conscious a person feels, the more likely deindividuation is to occur. We are more responsive to group influence when we lose self-awareness.

group polarization Enhancement of a group's already-existing attitudes through discussion within the group.

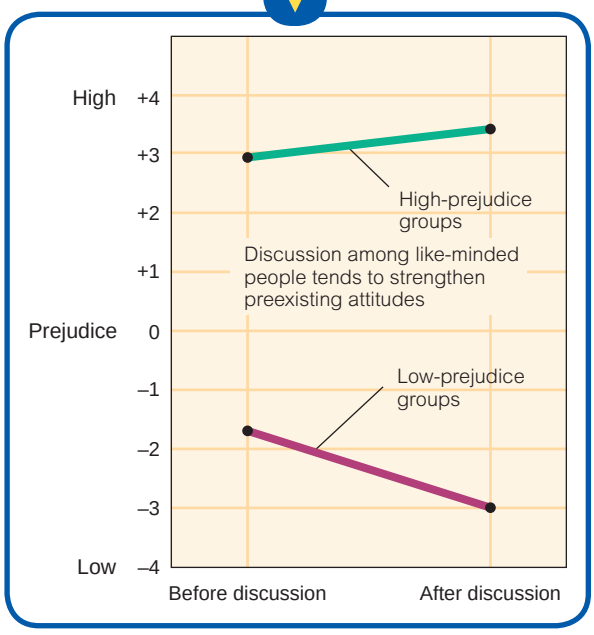
Group Interaction Effects

The presence of others can affect us in good ways (social facilitation) or bad (social loafing, deindividuation). The same is true of group interactions. Let's take a closer look at group polarization and groupthink.

GROUP POLARIZATION When politically oriented clubs, such as the Young Democrats or Teenage Republicans (as they are called in my school), gather to discuss local and national political issues, what's most likely to happen to their attitudes? Do the liberals become more or less liberal as they talk with one another? Are the conservatives more or less likely to take more conservative stances on issues by the close of their meeting? **Group polarization,** the enhancement of a group's already-existing attitudes through discussion within the group, would predict that liberals will become more liberal and conservatives will become more conservative. Evidently, our attitudes tend to migrate to an extreme, like the poles of Earth, when we're around like-minded people. David Myers and George Bishop (1970) found just this effect. Low-prejudice groups who discussed racial issues expressed even less prejudice after their discussion than they had before (see **Figure 18.7**). Similarly—and unfortunately—high-prejudice groups expressed higher levels of prejudice following their discussion of racial issues. Discussion among the like-minded tends to strengthen preexisting attitudes.

Figure 18.7
Group Polarization

When like-minded people discuss issues involving prejudice, their original views are likely to intensify. (Data from Myers & Bishop, 1970.)



Other researchers (McCauley & Segal, 1987) studied terrorism as an example of group polarization. Terrorism does not just suddenly erupt. The terrorist mentality builds as people with the same grievances gather and become more extreme in their views. In the absence of any moderating influences, terrorism reaches the point of kidnappings, murder, and suicide bombings. Fanatics grow more fanatical as group polarization takes hold.

GROUPTHINK Group polarization drives us to extremes, but groupthink tends to paralyze us. I watched this happen a couple of years ago, when our drill team was getting ready to perform at halftime at a state boys' basketball game. They decided to wear an article of clothing, a crop top, that the administration had banned. The music came up, they danced their five-minute show in the crop tops, and then left the court. When administrators later questioned the team members in an attempt to find out who was responsible for

groupthink The mode of thinking that occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of the alternatives.

the decision to wear the banned clothing, they were amazed by the responses. Not one member of the dance group had spoken up against wearing the crop top, even though they all knew it was banned. Two had even written an advance apology to the principal, sliding it under his door after school an hour *before* the game. A senior on the squad later explained, "We didn't think anything would happen to us since it was our last performance. We had paid for the outfits and deserved to be able to wear them. And we all just wanted to get along for our last performance." What this senior did was explain that groupthink had taken place. **Groupthink** occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of alternatives. We go along with a decision to get along with other people. In the case of the drill team, conformity, self-justification, overconfidence, and group polarization all fed into their groupthink decision to break the rules. (For more on groupthink, take a look at Psychology in the Real World: Groupthink.)

As president-elect, Barack Obama expressed a clear awareness of this concept. He said, "One of the dangers in a White House, based on my reading of history, is that you get wrapped up in groupthink, and everybody agrees with everything, and there's no discussion and there are not dissenting views" (Lee & Martin, 2008). Has his own administration avoided groupthink? Time (and psychology) will tell.

Psychology in THE REAL WORLD

Groupthink

Groupthink seems to have played a role in several national fiascos and tragedies. Groupthink may have contributed to the 1986 explosion of the U.S. space shuttle *Challenger,* which killed seven crew members, including social studies teacher Christa McAuliffe (Esser & Lindoerfer, 1989). The National Aeronautics and Space Administration (NASA) management team had tremendous confidence in their ability to launch *Challenger* into space, but they had been frustrated by numerous delays of this high-profile launch. Just before the launch was to take place, engineers voiced their opposition, citing concerns that rocket seals would not hold in the below-freezing weather. The management team demanded proof, and they did not pass on the engineers' concerns to the NASA executive in charge of the launch. The executive, thinking everybody had approved the mission, gave the order to launch, and *Challenger* flew into the history books as the biggest space disaster ever. The managers, who agreed to overlook the engineers' weather-related concerns, had given in to the lure of groupthink.

As you can see, resisting groupthink is sometimes vitally important. But *how* do you resist it? Irving Janis (1982) has three suggestions for group leaders:

1. Assign people to identify problems.
2. Be open to, and welcome, various opinions.
3. Invite experts to critique plans in various stages of development.

When it comes to making important decisions, there is strength in numbers—but only if you carefully consider your reasons for casting your vote with the majority.

PAUSE NOW OR MOVE ON

Turn to page 333 to review and apply what you've learned.

Our Power as Individuals

self-fulfilling prophecy When we believe something to be true about others (or ourselves) and we act in ways that cause this belief to come true.

WHAT'S THE POINT?

18-5 How does personal control influence our behavior?

We have talked at length about social thinking and social influence, or the power of the group. What about personal control, or the power of the individual? We can see this power in self-fulfilling prophecies and minority influence.

Self-Fulfilling Prophecies

My grandfather used to say, "Whether you think you can or you can't, you're right." He didn't originate that quotation, but he was offering a perfect description of a **self-fulfilling prophecy:** We believe something to be true about others (or ourselves), and we act in ways that cause this belief to come true. In one study, researchers told men that a certain woman found them either attractive or unattractive. The researchers then recorded and analyzed conversations between the men and the woman, revealing a self-fulfilling prophecy. If the man thought the woman saw him as attractive, he was more charming and she was more likely to act as if she did think he was attractive (Ridge & Reber, 1998).

If self-fulfilling prophecies come true, could we foster relationships by idealizing our partners? Apparently so. Over time, people seem to accept their partner's idealized perceptions as reality (Murray & Holmes, 2000; Murray et al., 1996). So, if your partner thinks of you as thoughtful and smart, you may internalize this perception and behave more thoughtfully and competently. Perhaps we can adapt my grandfather's philosophy: If you think your partner is bright or dim, clever or slow, honest or untruthful, sensitive or insensitive, then you may turn out to be right.

One Person Can Make a Difference

Rosa Parks refused to sit in the back of the bus, the section reserved for African-Americans. Her refusal triggered a boycott of buses, and eventually those rules changed. Parks's actions helped set the civil rights movement in motion.

BETTMANN/CORBIS

Minority Influence

Throughout the history of our world, individuals have had tremendous influences on groups. Rosa Parks refused to give up her seat to a white man and move to the back of a bus, and she fueled a civil rights movement. Mahatma Gandhi refused to eat as a political protest, and India won independence from Britain. Both overcame the majority's resistance to change.

Social history is often made by individuals who risk harm or ridicule when standing up against and speaking out about something wrong. In 2004, when prisoners in Iraq were being mistreated, Navy dog-handler William Kimbro refused to allow his attack dogs to be used in efforts to frighten and intimidate. Another soldier, Lieutenant David Sutton, knew

prisoners were being abused and reported mistreatment to his commanding officer. The actions of two or three soldiers put an end to the abuse at this Iraqi prison (O'Conner, 2004).

Minorities can sway majorities, but only if they stand firm. Social psychologists (Moscovici, 1985) have found that minorities who waffle in their convictions have trouble persuading others; those who are unwavering are far more successful in their persuasive efforts. The people steadfastly holding minority opinions may not win any popularity contests, but they may become influential. If you have the courage to voice your belief in a minority opinion, your influence on others may not be obvious at first. But by causing members of the majority to rethink their opinions, you may be planting the seeds of change.

PAUSE NOW OR MOVE ON

Turn to page 333 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 18

Thinking About Social Thinking and Social Influence

Social Thinking

Attributing Behavior to Personal Disposition or the Situation

WHAT'S THE POINT?

18-1 How does attribution theory predict the way we explain the behavior of others?

- According to attribution theory, we tend to explain the behavior of others as an aspect of either an internal disposition (an inner trait) or the situation.
- We often make the fundamental attribution error, the tendency to attribute the behaviors of others to inner dispositions rather than to situations.

Apply What You Know

1. You hear someone cursing at a locker that won't open. You think, "Wow, what a mean temper!" Which of the following concepts best explains your initial judgment?
   a. fundamental attribution error
   b. misattribution theory
   c. underestimating disposition
   d. typecasting
2. The tendency to attribute the behavior of others to internal disposition instead of situational factors is called the _____.

Attitudes and Actions

WHAT'S THE POINT?

18-2 How can attitudes affect actions? And how can actions affect attitudes?

- Attitudes can predict behavior under certain conditions: if the outside influences on what we do are minimal, if we are keenly aware of our attitudes, or if the attitudes are relevant to the behavior.
- Our behavior can also affect our attitudes, as shown by the foot-in-the-door phenomenon,

role-playing, and the concept of cognitive dissonance.

Apply What You Know

3. Jayden wanted to convince her father to loan her $50 for a concert ticket. First she asked for $30. After he agreed, she asked for the loan to be $40, which he also accepted. Then she got him to agree to the $50 loan she really wanted. Which technique did Jayden use?
   a. role-playing
   b. cognitive dissonance
   c. foot-in-the-door
   d. attitude modification
4. True or False: If you discover your behavior isn't consistent with your beliefs, you might experience cognitive dissonance.

Social Influence

Conformity and Obedience

WHAT'S THE POINT?

18-3 What does research say about conformity and obedience?

- Solomon Asch's conformity studies indicated that about one-third of participants were willing to give incorrect answers to conform to the group.
- Stanley Milgram's obedience studies indicated that 63 percent of participants would obey all instructions, including those that seemed to injure other participants.

Apply What You Know

5. Which statement best summarizes Asch's conformity studies?
   a. When role-playing, authority figures can change our attitudes toward others.
   b. Over 30 percent of people will conform to an obviously wrong answer given by others in a group.
   c. Smart people do not conform to the beliefs of others, but less intelligent people do.
   d. About 63 percent of people will conform to the orders of an authority figure.
6. What question did Milgram attempt to answer in his obedience experiments?
   a. Are people more likely to conform to an obviously wrong answer if they are in a group?
   b. Will people obey an authority figure, even if it means hurting a stranger?
   c. Do people try harder, or less hard, on a difficult task if they are ordered to obey?
   d. Have studies proven that obedience is more or less powerful than conformity?

Group Influence

WHAT'S THE POINT?

18-4 How does being around others affect our behavior, and how does group membership affect our thinking and decision making?

- Arousal provided by being in the presence of others strengthens our ability to perform well-learned tasks, but it diminishes our performance on tasks we have not yet mastered.
- In the presence of others, social facilitation, social loafing, and deindividuation can occur.
- Group membership can lead to both group polarization and groupthink.

Apply What You Know

7. You're assigned to a group project with three friends. You and one of the others end up doing most of the work. What phenomenon explains the lack of work by the other two members in the group?
8. Statements such as "Let's all get along" and "Don't rock the boat" could lead a group of people to dismiss the critical thinking necessary to make a decision. This is called _____.

Our Power as Individuals

WHAT'S THE POINT?

18-5 How does personal control influence our behavior?

- A self-fulfilling prophecy occurs when we believe something to be true about others (or ourselves) and we act in ways that cause this belief to come true.

- Minorities can sway majorities by planting the seeds of change and causing the members of the majority to rethink opinions.

Apply What You Know

9. Mr. Erikson believes a student to be clumsy. He sees this student slip on ice and remarks, "That student is simply clumsy." Several students slipped on the same ice, but Mr. Erikson said nothing about these students. Mr. Erickson's statement is an example of a(n) _____.
10. Rosa Parks's refusal to give up her seat sparked a boycott that ended discriminatory seating rules on buses and fueled the civil rights movement. Parks's courageous act illustrates how the actions of a _____ group can affect _____ opinion.

KEY TERMS AND KEY PEOPLE

social psychology, p. 311
attribution theory, p. 312
fundamental attribution error, p. 312
self-serving bias, p. 314
attitude, p. 315
foot-in-the-door phenomenon, p. 317
role, p. 317
cognitive dissonance theory, p. 319
conformity, p. 322
obedience, p. 325
social facilitation, p. 327
social loafing, p. 328
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group polarization, p. 329
groupthink, p. 330
self-fulfilling prophecy, p. 331
Philip Zimbardo (1933–), p. 318
Solomon Asch (1907–1996), p. 322
Stanley Milgram (1933–1984), p. 325

MODULE 19

Social Relations

Attraction
- Proximity
- Physical Attractiveness
- Similarity

Romantic Love
- Passionate Love
- Companionate Love

Altruism

Prejudice
- Ingroup-Outgroup: We and They
- Thought Processes and Prejudice

Aggression
- The Biology of Aggression
- Learning Aggression

Cooperation

Social networking makes it easy to connect with others, but good relationships with others depend on much more than the Internet.

Liking, loving, helping, hating, fighting, and befriending: We exhibit a wide range of behaviors in the way we relate to one another, all of which we consider in this module. As with so many areas of psychology, a complex combination of biological and environmental factors affects our social relations.

Attraction

WHAT'S THE POINT?

19-1 What factors influence attractiveness?

Who are your friends, and how did they become your friends? Does a person have to look a certain way, dress in a certain style, or listen to the same kind of music to be your friend? *Social psychologists* consider these and other

mere exposure effect The phenomenon that repeated exposure to novel stimuli increases one's liking of them.

questions in their scientific study of how we think about, influence, and relate to one another. Researchers have found three key ingredients to attraction: proximity, physical attractiveness, and similarity.

Proximity

If you attend Hoover High School in Alabama, you don't stand much of a chance of becoming friends with the Broken Bow High School students in Nebraska. A friendship can't develop if it doesn't begin. Several studies have shown that the people we like, date, and even marry are typically the people living in our neighborhood, sitting next to us in class, or working in the same building. What's near becomes dear partly because of the **mere exposure effect,** in which repeated exposure to novel stimuli increases our liking of them. You can easily see how this works if you think of a CD you bought because it had a hit song on track 1. Did you end up also liking the songs on tracks 2 and 3 after listening to the CD several times, even though you didn't particularly like them at first? Did those songs even become favorites after you listened to them repeatedly? If so, you experienced the mere exposure effect.

The mere exposure effect works for human faces as well (Moreland & Zajonc, 1982; Nuttin, 1987) and promotes fondness for the people with whom we spend time (Bornstein, 1989, 1999). Two researchers (Moreland & Beach, 1992) demonstrated the mere exposure effect by enrolling four women, all of whom were judged equally attractive, in a 200-student college class. The first never attended class, the second went 5 times, the third 10 times, and the fourth attended 15 classes. After the course ended, students judged the woman who had attended most often as the most attractive.

Our ancestors benefited from the mere exposure effect. Familiar faces were less likely to be dangerous or threatening than unfamiliar faces. Some researchers believe we are born with a tendency to bond with those who are familiar to us and to be leery of those we don't know (Zajonc, 1998).

Love at First Listen?

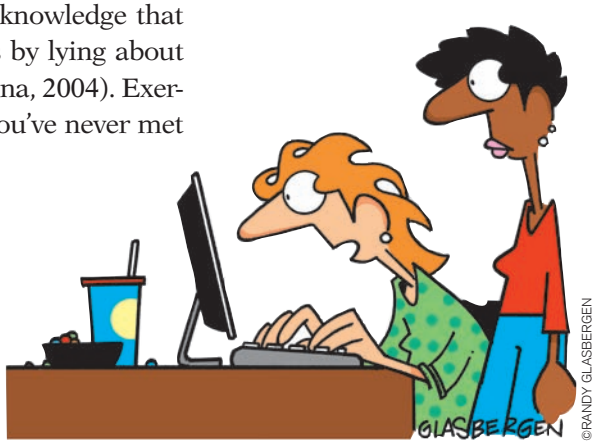
Have you ever started to like a song only after listening to it several times? The mere exposure effect may explain why you like something you initially didn't care for.

DEREK LATTA/ISTOCKPHOTO

The Internet is proving that proximity, or the distance between potential romantic partners, need not be quite so limiting. Online dating has become a booming business, with over 16 million people in the United States (and almost as many in China) having tried these matchmaking services (Cullen & Masters, 2008).

It remains to be seen how effective these online dating services are and whether proximity via keyboard really can measure up to the more traditional ways of meeting people. Interestingly, some researchers have found that romances and friendships formed online have a greater chance of lasting over two years than do relationships

formed face to face (McKenna et al., 2002). Still, it's common knowledge that many in the online dating game often misrepresent themselves by lying about their age, occupation, and physical appearance (Bargh & McKenna, 2004). Exercising caution when corresponding or chatting with someone you've never met is a must.



"I prefer online dating. Deleting someone with one click is less exhausting than a long and painful breakup!"

Physical Attractiveness

What most affects our first impression of others? Is it their wit? Charm? Politeness? Intelligence? Researchers have found that first impressions are based on something far shallower than brains or personality. Hundreds of studies indicate that *appearance* is the first filter we use to sort out the people we want to get to know from those we don't. We need look no further than the research on speed dating, which shows that first impressions and the desire to get to know someone better are strongly influenced by attractiveness (Finkel & Eastwick, 2008).

In another study, researchers matched students with blind dates for a dance. Before the date, all participants took a number of personality and intelligence tests and the researchers rated them on attractiveness. After two hours of talking and dancing, all participants rated their dates. The researchers found that the only measure reliably predicting whether the two daters liked each other was attractiveness (Walster et al., 1966). Other researchers found that women are more likely to say that the way a person looks does not affect them, but a woman's behavior is nevertheless affected by a man's looks (Feingold, 1990; Sprecher, 1989).

As a country, we go to great economic lengths to look good. Spending on beauty supplies exceeds the combined amount of money spent on education and social services (ASAPS, 2008). Why? We give attractive people the benefit of the doubt. We judge them as happier, healthier, and more successful than those who are less attractive, even when we know virtually nothing about these people (Eagly et al., 1991; Feingold, 1992). Your feelings about your own attractiveness predict how much you'll date and how popular you'll feel (Hatfield & Sprecher, 1986). The attractive people in the most successful movies are often portrayed as morally superior to the unattractive actors (Smith et al., 1999). All this evidence tips the scale in favor of attractiveness, but there is more to the attractiveness story.

Fortunately, few of us think of ourselves as unattractive. And despite what observers think, attractiveness does not seem to predict happiness or feelings of self-esteem for the person behind that appealing face (Diener et al., 1995; Major et al., 1984). Very attractive people are often suspicious of praise for their work ("Are you saying that only because I'm good-looking?"), whereas less attractive individuals are more likely to see praise as sincere (Berscheid, 1981).

We should also remember that standards for attractiveness come and go, and vary from culture to culture. In the 1920s, ultrathin was in for white, American women. By the 1950s, attractiveness in women reflected the full-figured voluptuousness of Marilyn Monroe. In the late 1960s, the flat-chested

What's Attractive?

Society's standards for female attractiveness change over time. Left to right: In the 1920s, thin was in; the 1950s favored a fuller figure. Today's look combines the skinny waistline of the 1920s with the buxomness of the 1950s, which can be difficult to attain.

© CLASSICSTOCK/ALAMY

BETTMAN/CORBIS

MARK DAVIS/FOX/PICTUREGROUP VIA AP IMAGES

model Twiggy was in and busts were out. Today, attractive women are depicted as both lean and busty. Cultural standards have led to push-up bras and even breast-enlargement surgery in North America, but women in other cultures strap on leather clothing to give the appearance of a flat chest. I never had a student with a pierced nose the first five years that I taught, but women in India and Pakistan have been piercing their noses for centuries. In other cultures, quite ordinary methods for increasing attractiveness include neck lengthening among the Karen tribes in Thailand and Burma and the Chinese practice (banned in 1949) of foot binding (to make feet look small). Beauty truly is in the eye of the culture.

Similarity

OK, so you live close to someone, and each of you thinks the other is attractive. What predicts whether you will become friends? Do opposites really attract? In the movies, we're intrigued by stories in which people who are different from each other end up together. But in real life, Princess Leia does not fall for a professional smuggler like Han Solo. We are reluctant to include people *dissimilar* from us in our circle of friends (Rosenbaum, 1986). Your friends are likely to share your interests, attitudes, age, intelligence level, and economic status, as well as your beliefs on religion, smoking, and race relations. Birds of a feather do flock together. And the more alike you and your friends are, the longer you are likely to stay together (Byrne, 1971).

Similarity, physical attractiveness, and proximity all contribute to attraction, but there are other components to this feeling. One of them is our tendency to like people who like us. We respond positively and warmly to those who like us, which typically increases their affection and friendliness for us. Expressing friendship toward another increases our attractiveness. If you want a friend, be a friend.

PAUSE NOW OR MOVE ON

Turn to page 353 to review and apply what you've learned.

Romantic Love

passionate love An aroused state of intense positive absorption in another, usually present at the beginning of a love relationship.

WHAT'S THE POINT?

19-2 What is the difference between passionate and companionate love?

The poet Walt Whitman once wrote, "I never could explain *why* I love anybody, or anything." It may be difficult to explain why we love, but we can identify two kinds of love: passionate and companionate (Hatfield, 1988).

BOL's EYE
by Shaun Boland
Byron, the brutally honest bachelor
Oh, Byron... I love you more than the morning sunrise.
I love you almost as much as my X-Box.
BOLAND

FROM "IN THE EYE OF THE BEHOLDER: A COLLECTION OF BOL'S EYE CARTOONS BY SHAUN BOLAND—WWW.BOLSEYE.COM"

Passionate Love

At the beginning of a love relationship, we are likely to feel **passionate love,** an aroused state of intense positive absorption in another. Emotions hit us in two ways: physical arousal and perceptions of that arousal. But what if arousal from some other source coincides with meeting a new person? How do we interpret that arousal? Psychologists decided to find out, and they discovered that men who are revved up by running in place, being frightened, or listening to something funny tend to rate a new attractive acquaintance or a girlfriend as more attractive. Those who are aroused apparently attribute some of that arousal to the presence of someone they see as attractive (Carducci et al., 1978; Dermer & Pyszczynski, 1978; White & Kight, 1984).

I've noticed that every year at least a few students who act together in the school plays end up going out. I know that proximity and similarity play a role in these relationships, but I've wondered if the arousal brought on by being in front of a large audience is sometimes transferred to another desirable person onstage.

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Passionate Love

After the highly charged passion fades and the feet get back on the ground, will there still be a loving relationship? Not likely, unless a deeper attachment has formed.

companionate love A deep affectionate attachment we feel for those with whom our lives are intertwined.

equity The condition in which people contribute to and receive from a relationship at a similar rate.

self-disclosure Revealing intimate aspects of oneself to others.

In nearly all passionate romances, the fire inevitably goes out and heads come out of the clouds. For a select few, a more enduring companionate love may develop.

Companionate Love

In countries such as India, Pakistan, and Iraq, many young people learn that passionate love, while thrilling and exciting, is not a good basis for marriage. They expect their families to select a partner for them—a person with similar interests and background. Interestingly, in cultures where love is not rated as important or essential for marriage, the divorce rate is lower than in the United States (Levine et al., 1995). Perhaps couples in these cultures strive for a more lasting **companionate love**—a deep, affectionate attachment for those with whom our lives are intertwined. This mature, steady love fosters friendship and commitment and is based more on affection than obsession. Couples sharing companionate love stand a better chance of an enduring relationship. In contrast, couples who fail to recognize the fleeting nature of passionate love may find their relationship in trouble when passions cool down (Berscheid et al., 1984).

So, how do we develop and maintain a companionate relationship? Equity and self-disclosure are two important factors. **Equity** is a condition in which people contribute to and receive from a relationship at a similar rate. In these 50-50 relationships, couples share decision making and possessions, and they freely give and receive emotional support. In relationships where equity exists, the likelihood of a continuing companionate love is good (Gray-Little & Burks, 1983; Van Yperen & Buunk, 1990).

Self-disclosure is the revealing of intimate aspects of oneself to others. Intimate aspects of our lives include our likes, dislikes, fears, accomplishments, shameful moments, and goals. Self-disclosing promotes and deepens friendship. This was demonstrated in an experiment in which one group of pairs asked each other self-disclosing questions ("When did you last cry in front of another?") or small-talk questions ("What was your high school like?"). After 45 minutes, the self-disclosing pairs reported feeling closer to their partners than the small-talking pairs did (Aron et al., 1997).

Companionate Love

Loving relationships built on more than passion are more likely to endure.

SUBBOTINA ANNA/SHUTTERSTOCK

Closeness is a key ingredient in companionate love, and it is more likely to be a reality in equitable relationships in which people feel they can share intimate and important details.

Processing your relationship in writing is another way to deepen a relationship. To demonstrate this, 86 dating couples agreed to have one partner spend 20 minutes for three consecutive days writing either about the day's events *or* about their deepest feelings and thoughts about their partner. Three months later, dating couples who had one partner write about thoughts and feelings were 50 percent more likely to be together than those who didn't (Slatcher & Pennebaker, 2006).

altruism Unselfish regard for the welfare of others.

PAUSE NOW OR MOVE ON

Turn to page 354 to review and apply what you've learned.

Altruism

WHAT'S THE POINT?

19-3 What factors influence altruistic behavior?

Acts of courage are not reported in the media at the same rate as acts of lawlessness, but the stories we do hear are heartwarming and impressive. Dave Sanders, a teacher and coach, stood up on a table in a high school cafeteria, directing students to safety as two other students sprayed the room with bullets. One of the bullets took Sanders's life. New York firefighters charged to their deaths up the steps of the burning and doomed World Trade Center in search of the injured on September 11, 2001. James Harrison, a college student, directed and helped pull others out of a burning plane after it had skidded down a runway and burst into flames. He died making one last trip into the cabin looking for survivors. All these people showed uncommon courage, but they also exhibited **altruism,** unselfish regard for the welfare of others. Regard for the welfare of others and a concept known as the *bystander effect* became major social psychology concerns after a particularly hideous rape and murder took place in the early morning hours of March 13, 1964.

Kitty Genovese, a young woman living in Queens, New York, worked a night shift that kept her up well into the early morning hours most days. Just before 3:00 A.M. on the night of her death, a stalker surprised Genovese on her way home from work. Over the course of the next hour, Genovese valiantly tried to fight off her attacker. An initial *New York Times* report stated that at least 38 people in nearby apartments heard her scream, "Oh my God, he stabbed me!" and "Please help me!" (The number of bystanders, while later contested, was still substantial.) Lights came on, people looked out their windows, but none of those hearing her calls came to her rescue or called the police while she was being assaulted. Twice, her screams drove off the attacker, and twice he returned. Genovese was raped twice, and she died of

Altruistic Behavior

Columbine High School teacher Dave Sanders directed students to safety, but he was fatally wounded in the process. His unselfish regard for the well-being of those students was a perfect example of altruism.

AP/WIDE WORLD PHOTOS

NY DAILY NEWS ARCHIVE VIA GETTY IMAGES

HENRY GROSKINSKY/TIME & LIFE PICTURES/GETTY IMAGES

Kitty Genovese and the Neighborhood in Which She Was Attacked

Although many people heard her screams for help, nobody came to her rescue or called for help.

multiple stab wounds just outside her own apartment. The police were finally called at 3:50 A.M.

The failure of those who admitted to hearing and seeing Genovese's attack and murder stirred up an international outrage. How could her own neighbors hear her calls for help and not respond? Had they become desensitized to violence? Did they simply not care? How could all these bystanders be so apathetic to someone so desperately in need of help? Social psychologists sprang into action, searching for answers to these questions.

Two researchers, **John Darley** and **Bibb Latané** (1968), approached the issues surrounding Genovese's death from a unique angle. They suspected the lack of intervention was not due to the fact that the bystanders had cold, uncaring personalities. Instead, they thought the answers would be found in the influence of the *situation*. That is, are there situations in which people are more or less likely to help others?

COURTESY OF JOHN DARLEY

JOHN DARLEY (1938–)
Psychologist who, with Bibb Latané, researched the circumstances that determine when a bystander will intervene on behalf of another person.

Darley and Latané decided to test this idea by setting up a number of situations in which people appeared to need help. In one study, for example, a student acted as if he were having an epileptic seizure. In another study, a person lay down on a public sidewalk with his eyes closed. In each study, the underlying questions were the same: Would others come to the aid of the person who appeared to need assistance? Would participants help someone having a seizure and call for help, or check to see if a person lying on a sidewalk was OK? After staging hundreds of false "emergencies," Darley and Latané had their answers.

In the case of the epileptic seizure, Darley and Latané found that people usually helped if they thought they were alone. That is, if participants thought they were the only ones who could help, they did. But look at **Figure 19.1.** Fewer people helped if they thought others were also hearing the calls for help. Those who thought others were close by were more likely to act the way Kitty Genovese's neighbors did. This evidence provides support for the **bystander effect,** which is the tendency for any given bystander to be less likely to give aid if other bystanders are present.

bystander effect The tendency for a person to be less likely to give aid if other people are present.

A decision-making process appears to influence our likelihood of helping someone else. Would you help a stranger lying flat on his back in a public

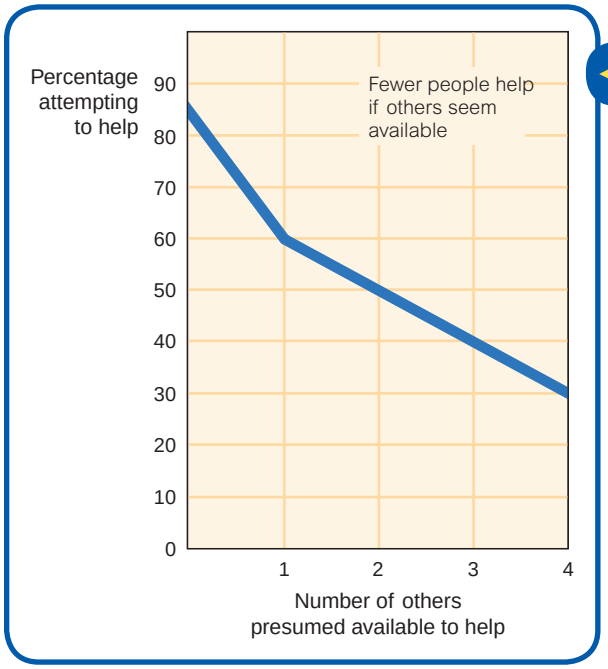


Figure 19.1
When Do We Help?

People are less likely to help someone in need if they believe that other people are around who could also help. (Data from Darley & Latané, 1968.)

place? First, you would have to notice the situation. If you notice it, then you would have to interpret it as an emergency. Finally, you would have to assume responsibility for helping (see **Figure 19.2**).

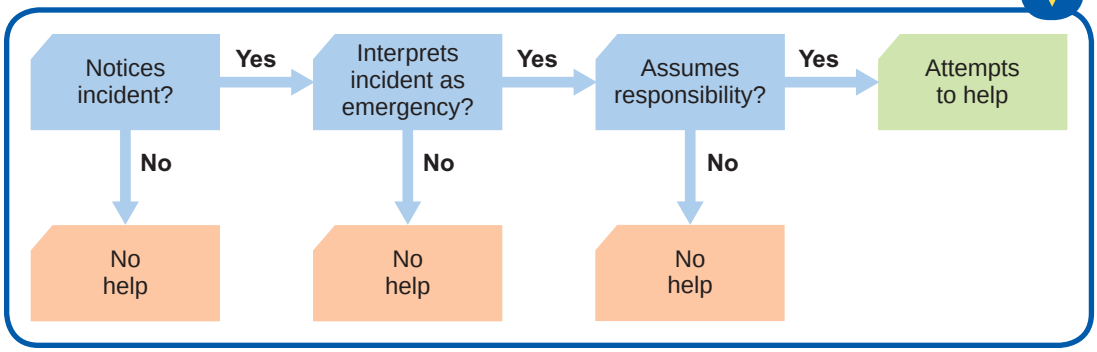
Altruism researchers have uncovered several additional situations and circumstances that increase the odds of helping someone in need. We are more likely to help if we

- are not in a hurry.
- believe the victim deserves help.
- are in a good mood.
- believe the victim is similar to us.
- are feeling guilty.
- are in a small town or rural area.
- just saw someone else being helpful.

Of all the items on that list, the most consistent finding is that happy people are helpful. No matter what it is that is making us happy, we are more

Figure 19.2
How We Decide to Help

This flowchart shows the events and thought processes we seem to go through in deciding whether to intervene when someone needs help.



Altruism Gone Awry

The captain seems to have missed his "altruistic opportunity."

"Women and children first!"

eager to help and are more generous when we're in a good mood (Carlson et al., 1988).

Interestingly, this relationship between altruism and happiness can also be seen in people's generosity with money. What happens when we give our hard-earned cash away? Those who give activate reward centers in the brain and are happier than those who spend all their money on themselves (Dunn et al., 2008; Harbaugh et al., 2007). You can see how a pretty positive cycle can develop here! Altruism can increase happiness, which in turn can lead to future altruistic acts.

PAUSE NOW OR MOVE ON

Turn to page 354 to review and apply what you've learned.

Prejudice

WHAT'S THE POINT?

19-4 How are stereotypes formed, and how can they lead to prejudice and discrimination?

Prejudice is an unjustifiable (and usually negative) attitude toward a group and its members. Prejudice usually goes hand in hand with **stereotypes,** which are generalized beliefs about a group of people. Taking action against a group because of stereotyped beliefs and feelings of prejudice is **discrimination.** Prejudicial beliefs may focus on people's gender, race, age, religion, body size, or numerous other characteristics.

Prejudice filters what we see and influences how we think about it. One study from the 1970s (Duncan, 1976) asked participants to interpret a videotape of a black man shoving a white man. Participants judged the shove to be an act of violence. However, when a different group of participants saw a white man shoving a black man, they were more likely to interpret this act as "horsing around." Our prejudices guide our perceptions.

Prejudice can be blatant and obvious or subtle and hard to notice. Most people now agree that schools, athletic opportunities, and transportation should be available to all people, regardless of race or gender. This change has taken place during my lifetime. But I was reminded of how subtle prejudice still exists when I was in a large city trying to hail a cab with a psychology professor from the University of Virginia. Heading back to our hotel after a wonderful meal, my friend stood on the corner of a busy intersection with his hand raised—a signal that he needed a cab. Three empty

prejudice An unjustifiable (and usually negative) attitude toward a group and its members.

stereotype A generalized (sometimes accurate but often overgeneralized) belief about a group of people.

discrimination In social relations, taking action against a group of people because of stereotyped beliefs and feelings of prejudice.

cabs passed him by, two of which slowed and then sped off. He looked at me and said, "You'd better try." I held up my hand, a cab stopped, and we climbed in.

What had just happened? A well-dressed, well-educated, middle-aged man stood on a corner and was ignored. I wasn't dressed nearly as well, but I was able to hail a cab almost instantly. "Has this happened to you before?" I asked. "It happens all the time," he replied. I'm of European-American descent. He is of African-American descent.

Similar forms of subtle prejudice are not hard to find. A study of drivers on the New Jersey Turnpike showed that African-Americans were only 13.5 percent of the drivers but they made up 35 percent of those pulled over by police. A survey asked college students if they felt excluded from school activities. Around 6 percent of the European-American students felt left out. Yet 24 percent of the Asian-Americans and 53 percent of the African-Americans felt excluded (Hurtado et al., 1994).

CATHRINE WESSEL/CORBIS

Prejudice in Action

The girl on the left looks upset with the other girl, who may have treated her differently because of racial prejudice. Discrimination is acting on a prejudice and is often related to race, gender, or age.

In another study, over 1000 Los Angeles landlords received an e-mail from a researcher using a fictitious name to ask about an apartment vacancy. If the researcher signed off using the name "Patrick McDougall," a favorable response was received from the landlord 89 percent of the time. However, if the researcher signed the identical message as "Said Al-Rahman," an encouraging reply was received only 66 percent of the time (Carpusor & Loges, 2006).

Another researcher uncovered a disturbing form of prejudice when he asked participants to grade a poor essay (Harber, 1998). Half the participants were told that a white student had written the essay and the other half that a black student had written it. Which paper do you think received the higher grade? If you guessed the one supposedly written by a white student, you guessed wrong. When participants thought a black student wrote the essay, they gave much higher grades and never handed out harsh criticism. Harber proposed that this phenomenon might be the result of lower expectations for papers written by black students. If so, is this evidence of prejudice? *Yes,* and it's discrimination. Less constructive criticism and inflated praise can suppress learning and achievement.

Prejudice also promotes gender inequalities. The United Nations (1991, 1993) estimates that close to 1 billion adults worldwide cannot read or write and that two-thirds of these adults are women. In the United States, those who take care of our children in day-care centers (usually women) are typically paid less than garbage collectors (usually men). The roots of gender prejudice can be seen in a study asking American parents-to-be whether they would prefer a boy or a girl. Of those who expressed a preference, 67 percent wanted a son (Lyons, 2003).

So, how does prejudice begin? Let's look at both social and thought processes that carry some responsibility for the development of prejudice.

ingroup "Us"—people with whom we share a common identity.

outgroup "Them"—those perceived as different or apart from "us."

ingroup bias The tendency to favor our own group.

scapegoat theory The theory that prejudice offers an outlet for anger by providing someone to blame.

Ingroup-Outgroup: We and They

Not long ago, a student told me he hated a high school five miles west of ours. The other school's soccer team had defeated our school's team, and this student played soccer. I asked, "You mean you hate the entire school?"

"No," he replied, "Just the kids who go there. All of them."

I was curious. "Why don't you like any of those kids?"

"They aren't us," he said. "They aren't like us at all."

Like a lot of students, this young man believed his school was better than anyone else's, even in the same town. He had drawn a mental boundary around our school, creating an **ingroup,** an "us," or people with whom he shared a common identity. Creating an ingroup simultaneously creates a "them," an **outgroup,** or a group of people we perceive as different or apart from our ingroup.

The desire to tell our friends from our foes and to have our group dominate other groups programs us to be prejudiced against strangers (Whitley, 1999). We develop an **ingroup bias,** a tendency to favor members of our own group, often at the expense of those in the outgroup. In schools, students often form cliques that streamline judgment about others. Are you in a clique? The preps? Skaters? Band or drama kids? Jocks? Geeks or freaks? How does your clique prejudge those who aren't members?

When things don't go as planned, we often aim our anger at a target, someone or something we can blame for the problem. The soccer player who disliked students in the rival school didn't stop at the players on the other team. "The refs were terrible!" he explained. "And they never called penalties on the other team. We should have won, but we couldn't beat the refs." **Scapegoat theory** states that prejudice offers an outlet for anger by giving us someone to blame. Evidence for scapegoating is seen in studies where temporary frustration intensifies prejudice against another group (Koltz, 1983).

One result of putting others down is a boost in our own self-esteem or feelings of status. In one experiment, participants were made to feel insecure after experiencing failure. Self-esteem returned after the participants belittled and criticized another person or a rival school (Cialdini

Ingroup or Outgroup?

People with a common identity often form an ingroup that excludes others.

VICKY KASALA/GETTY IMAGES

A. RAMEY/PHOTOEDIT, INC.

TONY FREEMAN/PHOTOEDIT, INC.

BOB MITCHELL/CORBIS

EDWARD BOCK/CORBIS

& Richardson, 1980; Crocker et al., 1987). Perhaps this explains why my soccer-player student cheered when he learned that the rival school had lost at the state tournament.

Are You in a Clique?

Are you a member of an ingroup? Band kid? Drama kid? Jock? Skater? What other cliques exist in your school?

Thought Processes and Prejudice

Prejudice grows out of our tendency to form groups and from our urge to vent anger or blame others when times are hard. Prejudice is also a result of our mind's attempt to make the world around us easier to understand. Two ways in which we do this are through categorization and thinking through the lens of the just-world phenomenon.

Categorization It is easier for a cook to find recipes in a cookbook when they are grouped by categories, such as breakfast foods or pastas. Pharmacists keep track of the medicines they distribute by using categories such as painkillers and cough suppressants. Psychologists also categorize when they publish their findings, with brain research likely to end up in a journal of neurology and conformity data to appear in a social psychology journal. The cook, pharmacist, and psychologist categorize to simplify what they do. We all categorize in everyday life, too, especially when we assign people to groups. When we categorize, we don't have to think as hard as when we assess each person for who they really are. Categorization simplifies our thought processes.

How does categorization affect us? Studies have shown that categorization of people can lead to the development of the **other-race effect,** also called the *own-race bias*. This tendency shows up when we say that members of an

other-race effect The tendency to recall faces of one's own race more accurately than faces of other races.

just-world phenomenon The tendency to believe that people get what they deserve and deserve what they get.

ethnic group other than our own act alike, look alike, or have similar personality traits, while maintaining that members of our own ethnic group have great diversity (Kelly et al., 2007).

Unfortunately, we often stereotype those we've categorized. Stereotypes may or may not contain a hint of truth, but they are likely to bias our perceptions of others. One study asked participants to listen to the radio broadcast of a basketball game, to view a photo of a particular player, and to evaluate his performance. Those who saw a photo of a black athlete assessed the player's efforts more highly than those who viewed a photo of a white athlete (Stone et al., 1997).

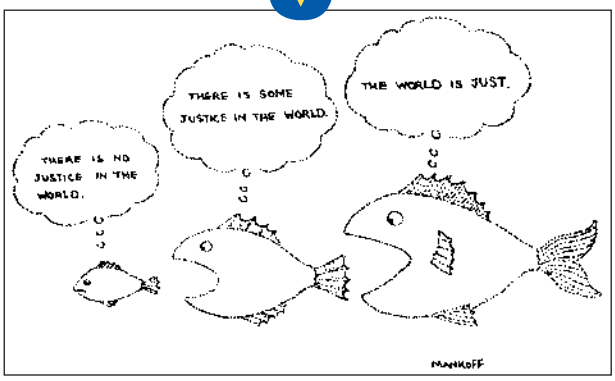
Categorization adversely affects our awareness of diversity. We know the strengths, weaknesses, and even the peculiarities of people in our own groups, but we are often ignorant of, or indifferent to, diversity in those we categorize. Overestimating the similarities of those not in our group simplifies our thought processes: By thinking others are the same, we don't have to spend time sorting one person out from another.

Just-World Phenomenon

The **just-world phenomenon** is the tendency to believe that the world is just and that people get what they deserve and deserve what they get. This belief reflects what many of us were taught as children: that good is rewarded and evil is punished. This kind of false assumption promotes such thoughts as "Unsuccessful people are bad, and the poor get what they deserve." The flip-side thought is "Successful people are good, and the rich deserve their riches." By thinking the world is fair, we justify our prejudices: Everything is as it should be. Just-world thinking wrongly suggests that ghettos are filled with people who are poor because they don't want to work; therefore, the poor deserve their poverty. Older Americans can't afford prescription drugs? Just-world thinking suggests that this is their own fault for not saving enough money for their retirement.

The Just-World Phenomenon?

The way we judge the fairness of situation may be directly related to our personal perspective.



THE NEW YORKER COLLECTION 1981 ROBERT MANKOFF FROM CARTOONBANK.COM. ALL RIGHTS RESERVED.

In our attempts to make the world seem fair, we sometimes come up with skewed thinking. We see the just-world phenomenon at work when experiments reveal a tendency to blame the victims of crimes. Researchers in one 1980s study gave participants a detailed account of a date-rape crime. Participants hearing this account viewed the victim's behavior as partially responsible for the crime. The common refrain was that "she should have known better" than to go out with the perpetrator and act or dress the way she did. However, when the same date story was presented without the rape ending, participants did not say the victim's behavior invited rape (Janoff-Bulman et al., 1985). The woman's behavior was at fault only when she was a victim of a crime.

PAUSE NOW OR MOVE ON

Turn to page 354 to review and apply what you've learned.

Aggression

WHAT'S THE POINT?

19-5 What biological and learning factors lead to aggressive behavior?

We hear or read about the baseball player stealing second base, the volleyball player spiking the ball over the net, or the salesperson who won't take "no" for an answer. Are these individuals behaving aggressively? Not according to psychology's definition of **aggression,** which is any physical or verbal behavior intended to hurt or destroy. Deliberately passing nasty, false rumors around school about a classmate is acting aggressively. A person who swears at you for standing in front of his locker is also acting aggressively.

Many people outside the United States see us as a country full of aggressive people. How else can we explain the fact that you are five times more likely to be murdered if you live in the United States than in Canada (Federal Bureau of Investigation, 2009; Statistics Canada, 2009)? Are these critics right? Are Americans more aggressive than people in other countries? Psychologists have not yet found the answer to that question, but they are taking a hard look at biological and environmental factors—nature and nurture—for a better understanding of why we are aggressive.

RADIUS IMAGES/ALAMY

Aggressive Behavior

Such behavior can be physical or verbal.

The Biology of Aggression

What triggers aggressive behavior in bullies and thugs? Biological factors bear some of the blame. The biological influences include genes, the nervous system, and biochemistry.

Genetic and Neural Influences Evidence for genetic aggression is apparent in certain dog breeds, which have been selectively bred to be aggressive watchdogs. Psychologists have bred genetically aggressive rats in laboratories. And in life outside the lab, studies show that genetically identical twins are more likely than fraternal (nonidentical) twins to report that both have violent tempers (Miles & Carey, 1997; Rowe et al., 1999).

Our nervous system is set up to make aggression possible if we are aggravated or provoked and if nothing is restraining us. Evidence suggests there is no one area in the brain controlling violence. Rather, we have a complex neural system that either stimulates or inhibits aggressive behavior, depending on the circumstances (Moyer, 1983). A part of the brain that seems to play a prominent role in aggression is the *amygdala* (pronounced uh-MIG-duh-la). One report of this connection comes from neurosurgeons trying to diagnose

aggression Any physical or verbal behavior intended to hurt or destroy.

a woman's disorder. When they activated an electrode implanted next to her amygdala, the woman stood up, ordered someone to take her blood pressure ("Take it now!"), and started beating her doctor. Another interesting report comes from Dorothy Lewis and her colleagues, who studied the histories of 15 death row inmates and found that all 15 had suffered brain trauma through a severe head injury (Lewis et al., 1986). Although most neurologically impaired people are nonviolent, the research suggests that a neurological disorder may have contributed to the inmates' aggressive crimes.

Biochemistry Alcohol, neurotransmitters, and hormones can tip the balance of your neural system's aggression control system. The primary biochemical player appears to be testosterone—the most important of the male sex hormones. Consider the following:

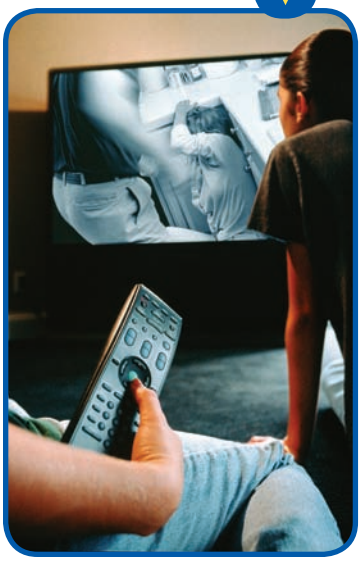
- Violent criminals are usually young males with lower intelligence test scores, lower levels of serotonin (a brain chemical), and higher testosterone levels (Dabbs, 1992; Dabbs et al., 2001).
- High testosterone levels have been associated with frustration, irritability, and impulsiveness, all of which can set the stage for aggression (Harris, 1994).
- Testosterone-reducing drugs suppress aggressive behavior (Pendick, 1994).
- In teenage boys, high testosterone levels are correlated with hard drug use, delinquency, and bullying responses to frustration (Berman et al., 1993; Dabbs & Morris, 1990; Olweus et al., 1988).

We should note that all these studies represent data from correlational studies. Keep in mind that the existence of a correlation does not prove that a cause-and-effect relationship exists. Correlations tell us that certain variables *are* related but not *why* they are related. Still, correlations are useful in helping us make predictions. If testosterone levels in young males drop, then we can accurately predict that their aggressiveness will decrease. In fact, both testosterone levels and the likelihood of committing a crime decrease as males age. Aggressiveness decreases with age as well.

Alcohol appears to have both a biological and a psychological effect on aggression. Frustration is more likely to produce aggression in those who have been drinking alcohol (Bushman, 1993; Ito et al., 1996; Taylor & Chermack, 1993). People under the influence of alcohol commit 40 percent of all violent crimes and 75 percent of all spousal abuse (Greenfeld, 1998). Psychologically, aggressiveness also increases in those who *think* they've been drinking even when they haven't (White et al., 1993). (For other activities that researchers have found to increase aggressiveness, see Psychology in the Real World: Video Games and Violence.)

Frightening Statistics

By the age of 18, most people will have seen tens of thousands of murders. The violent acts portrayed on television rarely show the suffering and pain that accompany murder and mayhem.



RON CHAPPLE/TAXI/GETTY IMAGES

Learning Aggression

Aggression in response to a threatening event may be a natural response. But we also learn aggression through having our aggressive behavior rewarded and by watching role models behave aggressively.

Psychology in THE REAL WORLD

Video Games and Violence

Take on the game identity of Chris or Claire Redfield in *Resident Evil,* and with a little practice you can stay alive for minutes on end, firing bullets into zombie cops and watching them slump, twitch, and bleed to death. Then you can kick the heads off video images trying to do the same thing to you. What do we learn from video games? This question was debated with great intensity after the 1997 and 1999 school murders in Paducah, Kentucky, and Littleton, Colorado, when authorities revealed that the assailants were particularly good at playing violent video games like *Doom, Mortal Kombat,* and *Duke Nukem.*

Video games appear to encourage aggressive thoughts and increase aggression. In one study, the most physically aggressive college males were the students who had spent the most time playing violent video games (Anderson & Dill, 2000). The same researchers found that those assigned to a nonviolent game (like *Myst*) became less hostile in follow-up tasks than those assigned to play games featuring blood, gore, and groaning victims. In another study, students became desensitized to real-life violence after exposure to violent video games (Carnagey et al., 2006). Yet another researcher found that young adolescents who play a lot of violent video games get into more fights and arguments, are more hostile, and get worse grades compared to those who avoid games such as the latest *Manhunt* and *Grand Theft Auto* (Gentile et al., 2007).

CINDY CHARLES/PHOTO EDIT

What Do Video Games Teach?

Research shows exposure to violent video games desensitizes people to real violence.

There is still a lot to learn. Yes, thousands of students play violent video games and never physically harm one another. But there is little doubt that playing these games increases aggressive responses and lowers sensitivity to cruelty. Also, no data support the idea that violent games serve as valuable "release valves" for feelings of fury and anger, as some say in defense of *Resident Evil* and others. In fact, playing these games seems to increase feelings of hostility (Ballard & Wiest, 1998).

If a bully takes your lunch money today and gets away with it, she'll probably have lunch at your expense quite often in the future. When experience teaches us that being aggressive gets us what we want, the chances increase that we'll be aggressive in the future. Children can learn this by proxy: If they see another rewarded for being aggressive, they are more likely to imitate that model's behavior. Parents sometimes display the exact behavior they don't want when they discipline their children by beating them. The message children receive? One way to solve problems is through aggression (Patterson et al., 1982, 1992).

So, what does this mean for your generation and your younger brothers and sisters? If you're average, by the time you reach age 18, you will have spent more time watching television than you will have spent in school. The typical grade-school child sees more than 8000 murders and 100,000 violent acts before even reaching middle school or junior high (Huston et al., 1992). Rarely do these violent acts show the victims' trauma that follows the offense.

Does watching violence, on television or at the movies, influence people to be aggressive? Correlational studies suggest that it does. Homicide rates in the United States and Canada doubled between 1956 and 1974, widely considered television's booming growth years. The same increase in homicide rates was seen in white South Africa after television was introduced in 1975 (Centerwall, 1989). After reviewing experimental data, the American Psychological Association made the following official statement: "There is absolutely no doubt that higher levels of viewing violence on television are correlated with increased acceptance of aggressive attitudes and increased aggressive behavior" (1993, p. 33). Elliot Aronson (1999) provides four reasons exposure to media violence might increase aggression:

1. *"If they can do it, so can I."* Previously learned inhibitions on being violent may be weakened by watching violent TV characters.
2. *"Oh, so that's how you do it."* Watching violent acts on television may spur imitation.
3. *"I think it must be aggressive feelings I'm experiencing."* The experience of watching violence on television may make anger and aggressive responses more accessible to the viewer.
4. *"Ho-hum, another brutal beating; what's on the next channel?"* Watching violence on television may desensitize our reactions to mayhem and reduce our sympathy for victims. Living with violence becomes easier.

Do not forget, however, that watching violent crimes on television does not automatically turn a person into a villain. Likewise, lots of children grow up in oppressive situations but do not grow up to be aggressive. Having a parent who regularly uses severe physical punishment does not doom a child to the same actions. Like all behavior, aggression is an interaction between nurture (outside situational factors) and nature (inner personal factors).

PAUSE NOW OR MOVE ON

Turn to page 355 to review and apply what you've learned.

Cooperation

WHAT'S THE POINT?

19-6 How do shared goals help resolve conflict between groups?

Friendly contact between different ethnic or racial groups can decrease prejudice (Pettigrew, 1969, 1997). But contact is not usually enough to break down the barriers between two different groups. One way to break down barriers is by using **superordinate goals,** shared goals that override differences among people and require cooperation. Muzafer Sherif (1966) discovered the power behind superordinate goals in a study of 22 boys attending a summer camp.

superordinate goals Shared goals that override differences among people and require their cooperation.

Sherif divided the boys into two groups. He assigned each group an area of the campsite, apart from the other. The groups then competed against each other in a series of events. The winners received prizes from camp counselors and contempt from the losers. Within days, the two groups were raiding each other's cabins, engaging in food fights over dinner, and when brought together, taunting each other.

Using superordinate goals, Sherif then turned the foes into friends. First, he created a water supply emergency. To obtain water, both groups had to pitch in and work together. A truck quit running, and all the boys had to push it to get it going. Soon, the taunting stopped, and the boys even pooled their money to pay for a recreational activity they could not otherwise afford. Competition and isolation had created enemies, but *cooperative contact* created friends.

AP PHOTO/LG. PATTERSON

Superordinate Goals

Cooperation is necessary to meet shared goals, especially if people need to overcome differences.

Cooperation can lead people to melt the icy walls of noninclusive subgroups, creating a new, more inclusive group (Dovidio & Gaertner, 1999). An "us" and "them" mentality turns into a "we" state of mind.

Cooperative learning, where students work together on projects, promotes interracial friendships in multicultural schools (Johnson & Johnson, 1989, 1994). Cooperative learning also enhances student achievement (Slavin, 1989). These results are so positive that thousands of teachers around the country have brought interracial cooperative learning to their classrooms (Kohn, 1987). These experiences set the stage for "adult work life and for citizenship in a multicultural society" (Carnegie Council on Adolescent Development, 1989).

Perhaps there is a message on the value of cooperative contact at a time when we see increasing strife, fragmentation, and warlike activities on our planet. With increased international exchanges, maybe we'll discover that our similarities far outweigh our differences and that we share such basic goals as having a healthy family, a safe home, and food on the table.

PAUSE NOW OR MOVE ON

Turn to page 355 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 19

Thinking About Social Relations

Attraction

WHAT'S THE POINT?

19-1 What factors influence attractiveness?

- Proximity is a major factor in attraction: The people we like, date, and even marry typically live near us.
- Appearance (physical attractiveness) is the first filter we use to sort the people we want to get to know from those we don't.

- Similarity is a major factor in attraction—we are likely to share our interests, attitudes, age, intelligence level, and economic status, as well as our beliefs on religion, smoking, and race relations, with our friends.

Apply What You Know

1. What best summarizes the social effect of physical attractiveness?
   a. A person's physical attractiveness is not correlated with anything predictable.
   b. Physically attractive people are judged as happier and healthier.
   c. We judge physically attractive people more harshly than less physically attractive people.
   d. The social effect of physical attractiveness increases the mere exposure effect.
2. True or False: Opposites attract because individuals are less likely to be attracted to people similar to them or who live in close proximity.

Romantic Love

WHAT'S THE POINT?

19-2 What is the difference between passionate and companionate love?

- The aroused state of passionate love is more likely to occur at the beginning of a relationship and sometimes develops into companionate love.
- Equity and self-disclosure are two important factors in developing and maintaining companionate love.

Apply What You Know

3. Which of the following types of love is more likely to be enduring?
   a. common-law love
   b. romantic love
   c. companionate love
   d. equitable love
4. Which of the following factors in a relationship are likely to help establish and maintain a companionate love relationship?
   a. equity and self-disclosure
   b. proximity and similarity
   c. superordinate goals and passionate love
   d. mere exposure effect and ingroup bias

Altruism

WHAT'S THE POINT?

19-3 What factors influence altruistic behavior?

- Altruism research reveals specific situations and circumstances that increase the odds of helping someone in need, including our beliefs about the victim, our mood, our similarity to the victim, if we are experiencing feelings of guilt, if it is an urban or rural context, and if we observe others helping.

Apply What You Know

5. Research regarding the murder of Kitty Genovese revealed that a major factor determining whether people will help someone in an emergency situation is
   a. our past training in emergency situations (first-aid training and so on).
   b. how serious we perceive the situation to be.
   c. our religious beliefs.
   d. whether we think we are alone or with a large group of people.
6. True or False: The bystander effect describes the fact that any given bystander is more likely to help if other bystanders are present.

Prejudice

WHAT'S THE POINT?

19-4 How are stereotypes formed, and how can they lead to prejudice and discrimination?

- People readily form generalized beliefs about groups of people.
- Ingroup bias is the tendency to favor members of our group, often at the expense of those in the outgroup.
- Categorization simplifies thought processes, but these mental categories can also lead to the development of stereotypes and prejudice.

Apply What You Know

7. A letter to the editor claims, "Rich people have worked hard and deserve every dime they

make." This letter writer's beliefs are an example of

a. the just-world phenomenon.
b. companionate attitudes.
c. altruism.
d. outgroup bias.

8. Which theory states that prejudice offers an outlet for anger by providing someone to blame?

Aggression

WHAT'S THE POINT?

19-5 What biological and learning factors lead to aggressive behavior?

- Biological influences on aggression include genetic influences, the nervous system, and biochemistry.
- People learn aggression by having their own aggressive behavior rewarded and by watching role models behave aggressively.

Apply What You Know

9. Aggression research finds that which of the following chemicals is associated with higher levels of aggression?

a. dopamine
b. caffeine
c. testosterone
d. serotonin

10. True or False: Hurtful verbal behavior is not considered to be aggression.

Cooperation

WHAT'S THE POINT?

19-6 How do shared goals help resolve conflict between groups?

- Superordinate goals require cooperation and override differences among people. Isolation can create enemies, but cooperative contact, through the use of superordinate goals, can create friends.

Apply What You Know

11. Muzafer Sherif found that one of the most effective ways to reduce prejudices between groups is to

a. provide educational classes about each group's culture and history.
b. reduce the mere exposure effect through increased self-disclosure.
c. create a shared goal that requires the groups to cooperate to succeed.
d. eliminate the bystander effect by requiring everyone in the group to speak.

12. What do we call shared goals that override differences among people and require their cooperation?

KEY TERMS AND KEY PEOPLE

mere exposure effect, p. 336
passionate love, p. 339
companionate love, p. 340
equity, p. 340
self-disclosure, p. 340
altruism, p. 341
bystander effect, p. 342
prejudice, p. 344
stereotype, p. 344
discrimination, p. 344
ingroup, p. 346
outgroup, p. 346
ingroup bias, p. 346
scapegoat theory, p. 346
other-race effect, p. 347
just-world phenomenon, p. 348
aggression, p. 349
superordinate goals, p. 352
John Darley (1938–), p. 342
Bibb Latané (1937–), p. 342

Nature, Nurture, Culture, and Gender

MODULES

20 Nature and Nurture in Psychology

21 The Psychology of Culture and Gender

In the next two modules, we explore some of the influences that shape us into the individuals we become. The route to becoming the person who is uniquely you is shaped by your biological inheritance, your relationships with others, your culture, and your gender. Let's start by looking at how your genetic inheritance and things you learn interact.

MODULE 20

Nature and Nurture in Psychology

So, is it environment or genetics that most affects who we become and how we behave? Let's take a closer look.

Genetics in Brief

Nature and Individual Differences

- Twin Studies
- Adoption Studies

Environment Matters

- Early Learning and Brain Development
- Peer and Parent Influence
- Cultural Influences

Imagine for a moment that your adoring parents, who believe you are perfect, decide to clone you, creating a perfect genetic replica of you. Would the new baby, your identical twin, grow up to be exactly like you? What if the baby were exposed to a different prenatal environment—one polluted (or not) by drugs or viruses? What if your parents had to give this baby up for adoption or decided to move to a different part of the world? And how would this child be affected by growing up as a part of a different generation? (Remember that 18 years from now, when this new person is in high school, Julia Roberts will be over 60 years old, and the "golden oldies" radio stations will be playing music by Rihanna, Taylor Swift, and Jay-Z.)

These questions all illustrate one of psychology's big issues: How do our families, our friends, and the culture in which we live affect us? A whole field of study, **behavior genetics,** focuses on this key issue—studying the relative effects of genes and environment on our behavior. Psychologists call this the *nature–nurture issue.*

The influence of *nature* consists of the **genes**—the biochemical units of heredity that make up the chromosomes—passed along by your parents the moment you were conceived. The influence of *nurture* comes from the **environment**—every nongenetic influence, from prenatal nutrition to the people and things around us.

behavior genetics The school of thought that focuses on how much our genes and our environment influence our individual differences.

genes The biochemical units of heredity that make up chromosomes.

environment Every nongenetic influence, from prenatal nutrition to the people and things around us.

What Makes You *You*?

Is your personality and appearance more a result of genetics or your environment?

CATCHLIGHT VISUAL SERVICES/ALAMY IMAGES

Possible environmental factors are so numerous that it is impossible to keep them all in mind. Here are a few examples:

- Being exposed to placental abnormalities, viruses, and drugs in the womb or not being exposed to these ill effects
- Consuming wholesome food and clean water or lower-quality food and contaminated water
- Growing up in a household with smokers or nonsmokers
- Being raised bilingually or monolingually
- Identifying with a particular cultural, ethnic, or religious group
- Learning how your culture expects boys or girls to think and act
- Making countless life choices, such as on a career or partner
- Deciding to live in an urban, a suburban, or a rural location

What roles do you think nature and nurture have played in making you who you are? In this module, we consider how genetics and the environment have worked together to make the person you see when you look in the mirror.

Genetics in Brief

WHAT'S THE POINT?

20-1 What are the elements of the genetic code (chromosomes, DNA, and genes)?

chromosomes Threadlike structures made of DNA molecules that contain genes.

You (and every creature on this planet) have your own genetic code, a biological blueprint that is found in every cell nucleus and that contains the master plan for your entire body (see **Figure 20.1**). Inside each nucleus are 46 **chromosomes,** threadlike structures made of molecules that contain the genes.

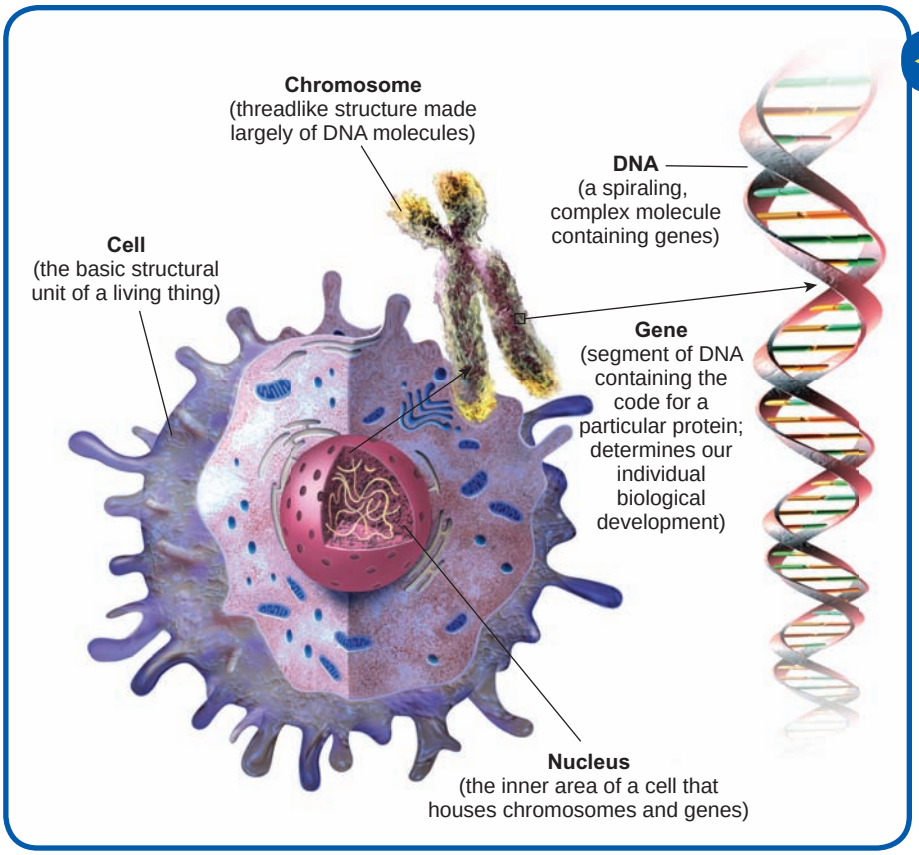

Chromosome
(threadlike structure made largely of DNA molecules)
DNA
(a spiraling, complex molecule containing genes)
Cell
(the basic structural unit of a living thing)
Gene
(segment of DNA containing the code for a particular protein; determines our individual biological development)
Nucleus
(the inner area of a cell that houses chromosomes and genes)

Figure 20.1
Genes: Their Location and Composition

Every cell in your body has a nucleus. Note how *every* nucleus contains your chromosomes, which in turn contain your genes.

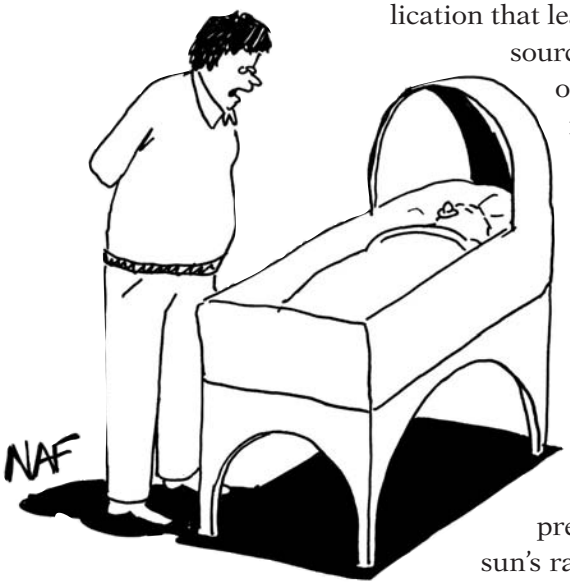
You received 23 chromosomes each from your mother and father, paired together at the moment of conception. Your chromosomes are composed of molecules called **DNA (deoxyribonucleic acid).** The smaller sections of DNA strands, the stairs on DNA's staircase, store your genetic code, your *genes*. Our genes not only set up our physical beings—making us humans, or dogs, or watermelons—but also influence our behaviors in many ways.

Genes are distinguished from one another by four-letter codes. Each letter in the code (A, T, C, or G) is called a *nucleotide*. Your largest chromosome has about 250 million nucleotides, and the smallest has 50 million (Wade, 1999). Consider that all 46 chromosomes can be found in every cell nucleus you have: How many nucleotides must there be in every nucleus? Billions.

How many genes do you have? The fruit fly, with a circumference half that of an apple stem, has about 15,000 genes. So, humans must have a million or a billion, right? Imagine the astonishment of those mapping the human genome when they learned that humans have only about 25,000 (Pennisi, 2005). You may be surprised to learn that 99.9 percent of your four-letter DNA sequences match that of every other human (Plomin & Crabbe, 2000). Genetically, you are nearly identical to everyone else in the world. With so much identical genetic makeup, it is not surprising that people from all countries exhibit similar behaviors. Worldwide, we enjoy greeting loved ones whom we've missed. In countries around the globe, 3-month-old babies smile, which tends to elicit smiling, cooing, and cuddling from adults. And no matter where we live, we experience happiness when we make someone feel better and disappointment when someone breaks a promise. Does this

DNA (deoxyribonucleic acid)
A complex molecule containing the genetic information that makes up chromosomes.

mutation Random errors in gene replication that lead to a change in the individual's genetic code and are the source of all genetic diversity.



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"So, how do you want to play this? Nature, nurture, or a bit of both?"

mean you should look or act like everyone else in the world? *No.* Genes are responsible for *predisposing* our appearance and behavior, not for concretely determining either.

We are far more similar than we are different, but we do vary from one another. Scientists have found *snips,* or sites, throughout our DNA that naturally differ between two unrelated individuals. And other variations exist where they shouldn't. These DNA **mutations** are random errors in gene replication that lead to a change in an individual's genetic code. Mutation is the source of all genetic diversity. Some mutations are desirable—most of us would appreciate a mutation leading to superior eyesight, for example. Other mutations, like those that predispose someone to cancer, are undesirable and feared. Predispositions are passed through the DNA to future generations.

Predisposition is an important concept, so let's look at this idea in a bit more detail. The presence of a predisposition for colon or breast cancer or some other disease does not necessarily doom someone to contract the disease. Predisposition merely means that the *possibility* of developing a disease exists. Whether that possibility will become reality often depends on environmental factors (poor diet, polluted air, stress). To choose a simple example, I may be predisposed to sunburn easily, but if I limit my exposure to the sun's rays, I won't have to put up with the pain of burned skin. Perhaps you can see why we refer to the nature *and* nurture issue, rather than nature *versus* nurture.

PAUSE NOW OR MOVE ON

Turn to page 369 to review and apply what you've learned.

Nature and Individual Differences

WHAT'S THE POINT?

20-2 How are twin studies and adoption studies used to learn about the influences of nature and nurture?

Intertwined from the moment of conception until death, nature and nurture are the two parts of the complex equation that is you. Our genetic similarity is amazing, but there is still that fraction of a percent that, when combined with innumerable environmental factors, can make each of us enormously different from all others. Why do some people seem smarter than others? Why are some people always slower at understanding a joke? Why can some people sing beautifully, yet there are others whose mouths we would prefer stayed shut? *Behavior geneticists* study such questions using twin studies and adoption studies.

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Identical Twins

These teens developed from a single fertilized egg that divided into two identical copies.

identical twins Twins who develop from a single fertilized egg that splits in two, creating two genetically identical organisms.

fraternal twins Twins who develop from two different fertilized eggs; they are genetically no more similar than any other two siblings, but they share a fetal environment.

heritability The degree to which traits are inherited.

Twin Studies

Only in Hollywood movies do you find cloned humans living their lives in a genetically engineered environment so that some mad scientist can study what makes them tick. But nature has provided its own potential genetics-lab participants in the form of human twins. **Identical twins** are nature's human clones; they develop from a single fertilized egg that splits in two, creating two genetically identical organisms. **Fraternal twins** develop from two different fertilized eggs. They are no more genetically similar than any other two siblings, but they share a fetal environment (see **Figure 20.2**). So, do the genetically identical twins behave more similarly than their fraternal twin counterparts? This is a question that intrigues behavior geneticists, who study the **heritability** of various traits, or the degree to which our traits are inherited.

Here is a simplified example of how a behavior geneticist might set up a study of identical and fraternal twins to investigate the heritability of intelligence:

1. Collect and compare data on the intelligence levels of *identical twins* raised in the same home.

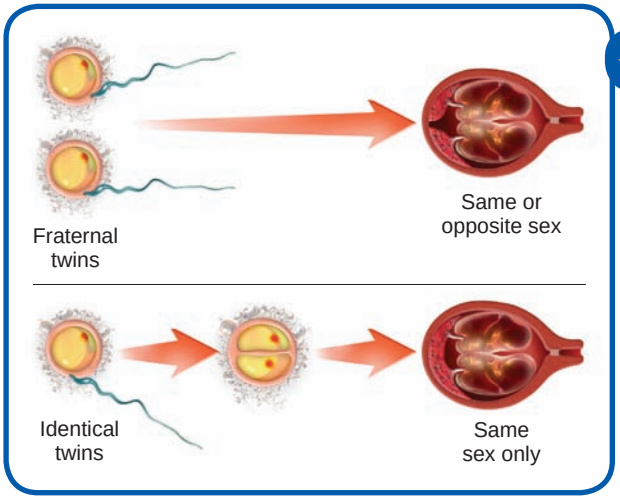

Figure 20.2
Conception of Identical Versus Fraternal Twins

Identical twins develop from a single fertilized egg that divides into two identical copies. Fraternal twins develop from two different eggs, each fertilized by a different sperm cell.

2. Collect and compare data on the intelligence levels of *fraternal twins* raised in the same home.
3. Compare the similarity in intelligence levels of the identical twins with the similarity in intelligence levels of the fraternal twins.

If the intelligence levels of the identical twins are significantly more similar than the intelligence levels of the fraternal twins, then we can infer that genetics, or nature, is at work. And researchers have indeed found a greater similarity in intelligence among identical twins (Lykken, 1999).

Genetic influences on personality traits appear to follow the same pattern. Studies in Sweden and Finland, using thousands of twin pairs, reveal that if one identical twin is outgoing, the other identical twin is likely to be outgoing—more so than in the case of fraternal twins. The same increased similarity can be found in the emotional stability of identical twins versus fraternal twins (Brody, 1994).

One twin study (McGue & Lykken, 1992) that looked at middle-aged twin divorce rates even suggests that genes influence divorce risk. The results showed that if one identical twin was divorced, then the odds of the other identical twin divorcing went up 5.5 times. However, if a fraternal twin divorced a spouse, the other fraternal twin was only 1.6 times more likely to wind up divorced.

But wait a minute! How can divorce be heritable? It's not even an option in some cultures, which forbid it. What we must remember is that *the behavior itself*—in this case, divorce—*is not inherited.* What *is* inherited are the genetic predispositions that may lead to the behavior. For instance, those with a greater predisposition to anger or conflict may be more likely to divorce than those who are not so predisposed.

As you can see, twin studies have helped us learn about the heritability of certain traits. Equally important is that they have taught us much about the influence of environment. Studies of reunited twins, those separated at birth and raised apart from each other, have helped demonstrate that *no* trait is completely inherited and that the behaviors of identical twins are not identical. Yet these genetic replicas, who sometimes grew up in dramatically different environments, have exhibited startling similarities in tastes and habits. Take identical twins Oskar Stohr and Jack Yufe, one raised by his grandmother in Germany as a Catholic and a Nazi, the other raised in the Caribbean as a Jew. Despite the obvious differences in their environments, both enjoy spicy foods, are domineering toward women, and report flushing the toilet before using it. The similarities between the two did not stop there, but perhaps you are wondering the same thing critics of the separated twin studies wonder: Couldn't two strangers sit down at a table and over the course of a couple of hours discover many bizarre but coincidental similarities? Enter science.

Fraternal (Nonidentical) Twins

These teens are also twins, but they developed from two different eggs, which in turn were each fertilized by a different sperm cell.

STEPHANIE DIANI/*THE NEW YORK TIMES*/REDUX

Using scientific measuring equipment, psychologists have studied separated identical twins and have found remarkable similarities in heart rates, brain waves, and intelligence levels (Holden, 1980a, 1980b; Wright, 1998). Other studies have found statistically significant similarities in personalities, abilities, attitudes, and fears (Bouchard et al., 1990; DiLalla et al., 1996; Segal, 1999). If a soccer match were held to determine whether nature or nurture has a greater effect on development, clearly the evidence from genetics and twin studies would be a goal scored for the nature team. But before we announce the winner, consider adoption studies.

Adoption Studies

Another way to assess the effects of nature and nurture is through adoption studies. Here the biological parents are providing the nature, and the adoptive parents are providing the nurture. By the time an adopted, 1-week-old girl reaches the age of 10, will her personality more closely resemble her biological parents' personalities or the personalities of the parents who raised her? What's your guess?

Study after study has yielded the same surprising result: Adopted children share more personality trait similarities with their biological parents than with their adoptive parents (Plomin & Daniels, 1987). Score one more goal for nature.

But the match is far from over. Although our personality seems to be something we are mostly born with, there are many other powerful areas in which parenting can influence a child. What about values, attitudes, and manners? What about political and religious beliefs? For all of these areas, nurture scores a goal. Several adoption studies show that parenting plays a major role in belief system development and development of behaviors important to functioning as a good citizen in our diverse societies (Brodzinsky & Schechter, 1990; Kelley & De Graaf, 1997; Rohan &

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Nature and Nurture

In adoption studies, biological parents supply the nature, and adoptive parents supply the nurture.

Zanna, 1996). Adopted children score higher on intelligence tests and are more likely to be involved in charitable activities than their biological parents (Sharma et al., 1998). Good parenting remains important. Nurture is back in the game.

PAUSE NOW OR MOVE ON

Turn to page 369 to review and apply what you've learned.

Environment Matters

WHAT'S THE POINT?

20-3 What has research revealed about the relationship between environmental influences and early brain development, parents, peers, and our culture?

One of the more celebrated separated-twin cases illustrates how easy it is to lay credit or blame at the feet of a child's parents for any given behavior. In this case, two identical twin boys, separated at birth and raised apart, were reunited in their thirties. Both could be considered "neat freaks" in the way they kept their homes, dressed, and scrubbed their "hands regularly to a raw, red color." When asked to explain the origin of the neatness, the first twin credited his mother and growing up in an extremely ordered environment, where he learned to appreciate that everything should be kept in its proper place. The second twin also credited his mother, although for different reasons. Why the perfectionism? "The reason is quite simple. I'm reacting to my mother, who was an absolute slob" (Neubauer & Neubauer, 1990).

Parents Matter

The nurturing of parents and guardians plays an important role in the development of a child.

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Parents are an important part of most people's early environment. With genetic influences accounting for roughly half the variation in our personality traits, parenting is a likely source to turn toward in accounting for the other 50 percent of those traits. It has been shown that parents influence their children's politics, faith, manners, and attitudes (Reifman & Cleveland, 2007). But how much credit do parents deserve for the child who wins a debate tournament, dances the role of Clara in the *Nutcracker Suite* ballet, or is elected president of the student council? How much blame should we heap on parents for the teenager who always shows up late to practice or rehearsal, takes up smoking, or has frequent scrapes with the law? If we listen to pop psychology, we hear all kinds of unfounded claims:

- Overprotective or overbearing parenting permanently underprepares a child for the real world.
- Parents who spank leave irreparable scars on a child's personality.
- Lenient parents who do not punish children severely create irresponsible children who will become troublemakers.

Is the mother or father who, even with the best intentions, occasionally pulls too hard in parenting's tug-of-war inflicting permanent psychological damage? Should we blame our parents for our failures in life and, subsequently, blame ourselves when our children fail? For answers to such questions, many researchers look to comparisons of nonidentical siblings raised together. Behavior geneticist Robert Plomin has found that "two children in the same family [are on average] as different from one another as are pairs of children selected randomly from the population" (Plomin & Daniels, 1987). Another well-respected researcher, Sandra Scarr (1993), believes parents should receive less blame for children who do not turn out as hoped or expected and less credit for children who do.

Certainly, environment matters, but growing up in the same household accounts for only a small portion (around 10 percent) of our personality differences. What other environmental factors might account for nurture's role in personality development? Let's look at three possible answers: early learning experiences, peer influence, and culture.

Early Learning and Brain Development

You've heard the phrase "Use it or lose it." Nowhere is this truer than with your brain, where experience nurtures nature. We do not remember everything we learn, but the brain processes we used in early learning do pave the way for later learning of more complex information. Consider the following neurological evidence:

- Rats housed for 60 days in an enriched (fun, stimulating) environment had brain weight increases of 7 to 10 percent more than rats housed in an impoverished (boring) environment (Rosenzweig et al., 1972). The

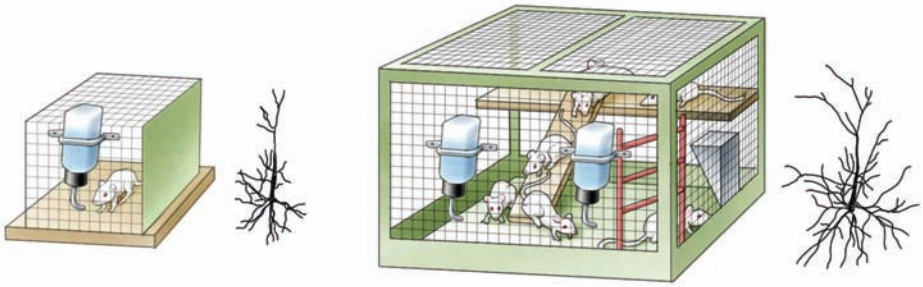

Figure 20.3
Experience Affects Brain Development

Mark Rosenzweig and David Krech reared rats either alone in an environment without playthings or with others in an environment enriched with playthings that were changed daily. In 14 of 16 repetitions of this basic experiment, the rats placed in the enriched environment developed significantly more cerebral cortex (relative to the rest of the brain's tissue) than did those in the impoverished environment. (From Rosenzweig et al., 1972.)

same study found a dramatic 20 percent increase in communication connections in the brain (see **Figure 20.3**).

- Premature babies who receive special handling (touch, massage) grow more rapidly, both physically and neurologically, than preemies who do not receive the same treatment (Drummond, 1998; Field et al., 2006, 2007).
- Sixth graders from impoverished environments who were given stimulating care as infants had higher intelligence test scores than their classmates who did not receive such care (Ramey & Ramey, 1992).

For our brains to meet their developmental potential, early experience is critical. The child born with perfect pitch will never have a chance to develop this gift if prevented from hearing music in early life. A child raised in abusive isolation will never learn to read, write, or speak like a normal adult.

As you get older, your brain's tissue will continue to change. The brain's pathways maintained through practice or experience will remain strong, and neglected pathways will fade with disuse. I recently found this out the hard way. Although I had learned to roller skate in sixth grade and had skated periodically after that, I had to relearn this skill after seven years without putting on my in-line skates. Similarly, you may find that the theorems and proofs you learned in geometry will seem foreign to you later in life unless you pursue a mathematically oriented career. The examples are endless, but one thing is clear: Use those brain pathways, created by nurture and nature, or lose them. (To see the benefits of laying down pathways that encourage positive emotion throughout life, see Thinking About Positive Psychology: Nurturing Happiness.)

Peer and Parent Influence

The tango danced by nature and nurture continues from childhood into adolescence, where peer influence becomes powerfully real and tangible. One of the most reliable predictors of dropout rate and failure in school is social rejection by a peer group (Rubin et al., 1999). Why, despite the antismoking commercials, posters, and warnings on cigarette packages, does smoking among teenagers periodically increase? Those inclined to pin blame on smoking parents are surprised to learn that parental concern over smoking

Thinking About POSITIVE PSYCHOLOGY

Nurturing Happiness

On many occasions, my grandmother said, "Nobody is born happy." She meant this both literally and figuratively. Literally, it's a good sign if a newborn baby has a loud, healthy cry upon birth. Figuratively, she was saying that you shouldn't wait for happiness to come to you. Rather, you should try to figure out things you can do to help make your life happier.

Science and positive psychologists agree with my grandmother: There are many simple things you can do to nurture happiness. Happiness and other positive emotions are increased when you

- express gratitude to others for things they have done to help you.
- challenge discouraging thoughts about the past.
- savor the good things in life (for example, a good grade on a test, sunsets, a tasty treat, or your favorite song) that we often take for granted (Seligman et al., 2005).

Martin Seligman has used what he calls the "good things in life" exercise as a savoring intervention to improve happiness. The exercise is designed to increase positive emotion about the recent past. To do this, he asks individuals to

1. record, every day for a week, three good things that happened.
2. also record why those good things occurred.
3. share those good things with a friend or family member.

Could nurturing happiness be just that simple? The answer is a clear *Yes.* After completing this exercise, Seligman found that participants, compared to control groups, scored higher on tests to measure happiness and were also happier and less depressed at a three-month follow-up.

Seligman points out that positive psychology is not meant to imply that there is a negative psychology. Promoting happiness, positive emotions, and well-being is in part an attempt to promote a *balanced* psychology. He writes, "We are committed to a psychology that concerns itself with repairing weakness (for example, therapy) as well as nurturing strengths—a psychology that concerns itself with remedying deficits as well as promoting excellence" (Seligman, 2008).

is less of a factor than researchers originally believed. Rather, teens in peer groups in which members smoke are far more at risk to start this life-endangering habit than are those with nonsmoking peers (Rose et al., 1999). Peer groups with smokers (1) offer easy access to cigarettes, (2) model pleasure from smoking, and (3) present the message that fitting in includes lighting up. Regardless of parental protests, thousands of American teens start their smoking addiction each day.

Peer group influence has been demonstrated in younger peer groups, too. Preschoolers who won't eat a particular food at home are more likely to eat that food when seated at a table with peers who like it (Harris, 1998). Immigrant children living in an environment filled with nonimmigrant peers will quickly adopt the culture of the peer group, sometimes at the expense of the culture they share with their parents. Children pick up the accent and conversational style of their neighborhood peers

Peers Also Matter

None of these teens smoke, and research indicates that if they continue to hang out together it is unlikely that any of them ever will. Peers can greatly affect our behaviors.

BOB DAEMMRICH/THE IMAGE WORKS

culture The shared attitudes, beliefs, norms, and behaviors of a group communicated from one generation to the next.

norms Understood rules for accepted and expected behavior.

(Harris, 2007). Psychologist Howard Gardner (1998) clearly sees the importance of a peer group *and* parents in raising children:

> Parents are more important when it comes to education, discipline, responsibility, orderliness, charitableness, and ways of interacting with authority figures (Vandell, 2000). Peers are more important for learning cooperation, for finding the road to popularity, and for inventing styles of interaction among people of the same age. Youngsters may find their peers more interesting, but they will look to their parents when contemplating their own futures. Moreover, parents [often] choose the neighborhoods and schools that supply the peers.

Cultural Influences

Culture is an elusive, invisible, abstract concept that forms the basis for much of our understanding of life (Ernst et al., 2000). **Culture** is the shared attitudes, beliefs, norms, and behaviors of a group communicated from one generation to the next. **Norms** are the understood rules for accepted and expected behavior within a group. Culture influences our food selection, religious choices, family activities, and more.

Because of the cultural rules we all possess, we develop a set of expectations about the kinds of behaviors others should exhibit. If others behave according to expectation, we may think, "This person is good." When others behave in a way we do not consider "normal" or socially appropriate, we have negative reactions, such as frustration and anger. In such cases, we may think, "This person is bad," or, "This person is stupid." Sadly, we tend to make these snap judgments without a second thought, often toward people from cultures that differ from our own.

We tend to believe that *our* culture's way of raising children is the *best* way. Be careful: Successful child rearing has been accomplished using many

Cultural Effects

Our cultural backgrounds are a big part of the "nurture" that influences our behavior and attitudes.

HORIZONS WWP/ALAMY IMAGES

methods. There is tremendous diversity worldwide in the way children are brought up, and leaders and heroes have emerged from a wide range of cultures.

PAUSE NOW OR MOVE ON

Turn to page 370 to review and apply what you've learned.

So, how do nature and nurture work together to make us who we are? While we have some clues, we don't yet fully know the answer to that question. Behavior genetics is still in its infancy. The ethical implications of genetic engineering and cloning are just beginning to emerge, and much reflection on the meaning of this research lies ahead.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 20

Thinking About Nature and Nurture in Psychology

Genetics in Brief

WHAT'S THE POINT?

20-1 What are the elements of the genetic code (chromosomes, DNA, and genes)?

- The human genetic code is made up of 46 chromosomes composed of DNA.
- Humans have about 25,000 sections of chromosomes, called genes, which predispose people for specific physical and behavioral traits.

Apply What You Know

1. Which of the following research questions would behavior geneticists be most interested in?
   a. How do humans perceive color?
   b. Which region of the brain controls voluntary movement?
   c. What is the most effective way to train an organism to respond in useful ways?
   d. Is personality more influenced by chromosomes or environment?
2. Which of the following most relates to the nature–nurture issue?
   a. parents and peers
   b. genes and environment
   c. culture and norms
   d. DNA and chromosomes

Nature and Individual Differences

WHAT'S THE POINT?

20-2 How are twin studies and adoption studies used to learn about the influences of nature and nurture?

- Studies with identical twins help researchers consider the effects of different environments on the traits and behavior of genetically identical people.
- Studies with fraternal twins allow researchers to consider the effects of similar environments on genetically different people.
- Studies reveal that adopted children share more personality trait similarities with their biological

parents than with their adoptive parents. Adopted children are more similar to their adoptive parents in belief systems and the development of behaviors important to functioning in society.

Apply What You Know

3. In twin studies, behavior geneticists are looking for
   a. differences between fraternal twins because they are raised in the same home.
   b. whether being a twin affects emotional development and social behaviors.
   c. similarities between identical twins because they share the same genetic code.
   d. how many times identical and fraternal twins occur in different cultures.
4. If adopted children are more similar in political views to their adopted parents than to their biological parents, then
   a. random mutations may be responsible for the differences between adopted children and adoptive parents.
   b. the genetic code determining political views probably occurs randomly.
   c. political views probably are not genetically predisposed.
   d. specific genes probably predispose people to political views.

Environment Matters

WHAT'S THE POINT?

20-3 What has research revealed about the relationship between environmental influences and early brain development, parents, peers, and our culture?

- For our brains to meet their developmental potential, early experience is critical.
- Parents are important when it comes to education, discipline, responsibility, orderliness, charitableness, and ways of interacting with authority figures.
- Peers strongly influence how we learn cooperation, find the road to popularity, and learn the styles of interaction among people of the same age.
- Our culture and norms affect our thinking and behavior in profound ways.

Apply What You Know

5. Which of the following behaviors are our peers most likely to influence?
   a. popularity at school
   b. exercise habits
   c. giving money to a charity
   d. keeping our room clean
6. A culture's _____ are its understood rules for accepted and expected behavior.

KEY TERMS

behavior genetics, p. 357
genes, p. 357
environment, p. 357
chromosomes, p. 358
DNA (deoxyribonucleic acid), p. 359
mutation, p. 360
identical twins, p. 361
fraternal twins, p. 361
heritability, p. 361
culture, p. 368
norms, p. 368

MODULE 21

The Psychology of Culture and Gender

Culture

Individualism and Collectivism

- Self-Concept
- Motivation and Emotion

Culture and Personality, Development, and Attachment

- Culture and Personality
- Developmental Psychology
- Attachment

Ethnocentrism

Culture and Gender

If asked, "What is your culture?" what would you say? Reading this module will help you answer this question.

Culture

WHAT'S THE POINT?

21-1 What is culture, and what factors influence how cultures develop?

One of my daughters once brought home a note announcing Multicultural Day at her school. On the given day, she was to dress in clothes and bring food representing the country of her ancestors. Of course, the school was really advertising a *nationality* day. Nationality is not culture. Many nations, including the United States, have multiple, equally important, coexisting cultures. To say that your nation is your culture is to ignore the multiple cultures in a nation. Your passport does not always determine your culture.

Race is not culture either. First, two people of the same race can be either different or similar culturally. Second, the term *race* is becoming meaningless

Race Is Not Culture

Two people of the same race may have different cultures.

TOM MARVIN/ISTOCKPHOTO

URIY/ISTOCKPHOTO

because researchers have discovered that the genetic differences among people *within* a race are equal to or greater than those that distinguish people of two *different* races (Keith, 2002). Your *race* is a set of characteristics programmed into your genetic code. Your *culture* is a set of behaviors and beliefs you learn from the people in your environment.

Ethnicity is a term that reflects the traits you have in common with some relatively large group of people with whom you share a history. Knowing a person's ethnicity or race does not provide meaningful information about how that person thinks and might behave. What do you know about me if I tell you that my name is Pat Dolan, I check the "black" box for race on government forms, and my ethnicity is African-American, Irish-American, and Cherokee? Could you predict my thoughts or behaviors? Surely not. What other clues might you pick up from knowing my culture? To answer that question, you must know more about this concept.

PHOTO BY BOB WILLINGHAM, COURTESY DAVID MATSUMOTO

DAVID MATSUMOTO (1959–) Psychologist and cross-cultural psychology expert.

Psychologist **David Matsumoto** (1999; Matsumoto & Juang, 2007) defines **culture** as a system of subtle and obvious rules established by a group to ensure its survival. These rules include the shared attitudes, beliefs, norms, and behaviors of a group that are passed from one generation to the next. Matsumoto sums up this definition by calling culture "the software of our minds" (Ernst et al., 2000).

Culture is the basis for much of our understanding of life, influencing most of the daily decisions we make. It is reflected in the food we eat, the clothes we wear, the houses we live in, and the technology we use. The effects of cultural differences are also seen in our modes of transportation, family activities, and governments. Is culture also evident in religion and science? *Yes*. Although we never see culture itself, we see the manifestations of culture everywhere. How and why do so many cultural traditions develop? At least four factors influence culture development and diversity (Matsumoto, 1993):

- *Population density*—Societies with higher population densities require more rules for maintaining social order. For example, there are more traffic laws on the books in Los Angeles than there are in my hometown of Broken Bow, Nebraska. The laws in Los Angeles have become a part of the culture, reflecting a huge city's attempt to maintain order while letting people travel as they need to.

culture The shared attitudes, beliefs, norms, and behaviors of a group communicated from one generation to the next.

ROBERT CAPUTO/IPN/AURORA

B & C ALEXANDER/PHOTO RESEARCHERS, INC.

B.S.P.I./CORBIS

Climate Affects Culture

Life-style and clothing, both of which reflect culture, are affected by climate.

- *Climate*—Life-style adapts to climate. Weather affects the clothing people put on their backs and the food they put on the table. The life-style of a family living in a sparsely populated Saudi Arabian village will be different from that of a family living in downtown Chicago. Each will need nourishment and protection from the forces of nature, but they will handle these needs in different ways.
- *Resources*—Working together to survive is essential in a land where resources are scarce. Teamwork is less likely to occur in places where resources are abundant. People in Afghanistan, where resources such as food and clothing are harder to come by, tend to experience more close-knit local societies than their counterparts in France or England.
- *Technology*—Inventions such as the computer allow people to work alone, without any need for face-to-face interactions. The woman doing business from a personal computer in the basement of her Connecticut home will not have the face-to-face experiences of the woman selling fruits and vegetables in the streets of New Delhi.

PAUSE NOW OR MOVE ON

Turn to page 384 to review and apply what you've learned.

Individualism and Collectivism

WHAT'S THE POINT?

21-2 What are the effects of individualist and collectivist cultures on sense of self, achievement motivation, and emotional perceptions?

Do you see yourself as an independent person whose personal goals take precedence over the needs of others? Or do you see yourself connected to others, sacrificing your needs to satisfy the group? Your answer to those

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Collectivist Societies

People raised in a collectivist society are more likely to value the needs of a group over needs of the individual.

questions may reveal whether you were raised in a culture that values individualism or one that values collectivism. **Individualism** is a cultural style that places personal goals or needs ahead of group goals or needs. Individualists define their identity in terms of personal attributes rather than group identification. **Collectivism** is a cultural style that places group goals or needs ahead of personal goals or needs and defines personal identity accordingly. Asians and Africans typically raise their children in a collectivist environment. Western Europeans and North Americans are usually raised as individualists.

Of course, not every culture can be classified as either individualist or collectivist. Therefore, it's more realistic to speak of an individualism-collectivism dimension, a scale on which you can indicate the degree to which your needs, wishes, and values reflect you or the groups to which you belong (Matsumoto, 1999). A teenager in Japan, a country with a tendency toward collectivism, would probably put group needs ahead of personal needs. Teens in the United States, a country with a strong tendency toward individualism, would probably place personal goals ahead of group goals. These different cultural viewpoints manifest themselves in a number of ways. One interesting study asked teenagers whether the phrase "My parents will be disappointed in me" ever rings true as a concern. Japanese teens were three times more likely than their American counterparts to indicate that this is a concern (Atkinson, 1988). A comparison of individualism and collectivism can be seen in **Table 21.1.**

One advantage of using the individualism-collectivism dimension is that we can predict and interpret cultural differences without relying on an *impression* we have about a particular cultural group, perhaps based on something we've seen on television. Let's explore how this dimension affects cultural differences in our self-concept, motivations, and emotions.

Table 21.1

Comparing Individualism and Collectivism

Concept	Individualism	Collectivism
Self	Independent (identity from individual traits)	Interdependent (identity from belonging)
Life task	Discover and express one's uniqueness	Maintain connections, fit in, perform role
What matters	Me—personal achievement and fulfillment, rights and liberties, self-esteem	Us—group goals and solidarity, social responsibilities and relationships, family duty
Relationships	Many, often temporary or casual, confrontation acceptable	Few, close and enduring, harmony valued
Understanding behavior	Behavior reflects one's personality and attitudes	Behavior reflects social norms and roles

Source: Adapted from Schoeneman (1994) and Triandis (1994).

Self-Concept

individualism Giving priority to personal goals over group goals and defining identity in terms of personal attributes rather than group identification.

collectivism Giving priority to the goals of the group (often the extended family or work group) and defining personal identity accordingly.

Your sense of self—who you are—is closely tied to how you understand the world and your relationships with others. The way we think about ourselves varies from culture to culture.

People raised in an individualist culture have an *independent* understanding of self. Most Americans have this independent sense of self. So, when asked to explain who you are, you are likely to discuss your individual preferences, abilities, and goals. You probably have a sense that you are *separate* from people relevant to your life. Indeed, I asked my two teenage daughters to explain who they are, and they said things like "I dance," "I play piano," and "I like pizza." These would be considered strange and inappropriate answers from teenagers raised in a collectivist culture. Those young people probably have an *interdependent* understanding of self. They see their primary task as fitting in and helping maintain cohesiveness among individuals in their group. They also have a sense that they are *connected* to other people. And for people with this collectivist view of self, explaining who you are more likely includes a discussion of the roles you play within a group (Ernst et al., 2000).

Viewing your own abilities ("I dance" or "I play the piano") as the most important information you can offer about yourself is a characteristic of individualist cultures. We who come from an independent culture also tend to explain other people's behavior in terms of their disposition ("He sure is cranky") and to ignore the effects of the situation ("He is recovering from surgery"). In contrast, members of collectivist cultures are more likely to believe their success in fitting in with their group ("I am respected by my family") is their most important characteristic and that behavior (such as responding angrily to a simple request) is guided by situational factors. Being raised in an individualist or collectivist culture influences more than our self-concepts. It also significantly affects what motivates our behavior and our emotional reactions.

Motivation and Emotion

How many times have your family and teachers urged you to excel—to be the best you can be or to strive to achieve your goals? *Achievement motivation* refers to this desire to excel, and it is very much a product of your cultural environment. Desire to achieve is rooted in the tangible personal rewards of achievement, which often means pulling ahead of other students. Individualist cultures, which view motivation as an internal push and achievement as an individual triumph, like achievement motivation. Collectivist cultures have different achievement goals, and they relate to enhancing the family's social standing. Desires to achieve emerge out of a sense of indebtedness to parents and are guided by the expectations of family members and other relevant people. Obligation to others or a sense of duty to the group drives this version of achievement (Yang, 1982). For example, a researcher addressing why some students earn higher grades than others despite similar levels of intelligence would be wise to consider these cultural differences in achievement motivation as a possible factor.

But how can culture influence our emotional reactions? Consider this: How good are you at recognizing emotions? Can you tell when your friends are

BRIAN YARVIN/THE IMAGE WORKS

Fago* or *Ker?

This person is experiencing an emotion the Ifaluk of Micronesia might call *ker,* a combination of happiness and excitement they consider socially disruptive. Culture affects our display of emotion and our perception of it.

happy, angry, or embarrassed? Would you be able to recognize a more subtle emotion, combining compassion, love, and sadness? The Ifaluk of Micronesia can. They call this emotion *fago,* and they believe it promotes helping behavior. But a similar emotion, *ker,* combines happiness with excitement, and the Ifaluk view it as socially disruptive and dangerous (Lutz, 1988). The collectivist views of the Ifaluk have clearly colored their emotional expression and interpretation, just as our individualist views color ours. It's impossible to identify all the emotions that people around the world recognize. But isn't it interesting to consider that emotions exist that we've never been exposed to? Researchers have discovered that many emotions—including anger, fear, and happiness—are found in all cultures, but others, such as *ker,* are unique and identified only in particular cultures (Russell, 1991).

PAUSE NOW OR MOVE ON

Turn to page 384 to review and apply what you've learned.

Culture and Personality, Development, and Attachment

WHAT'S THE POINT?

21-3 How does culture influence personality, development, and parent-child attachment?

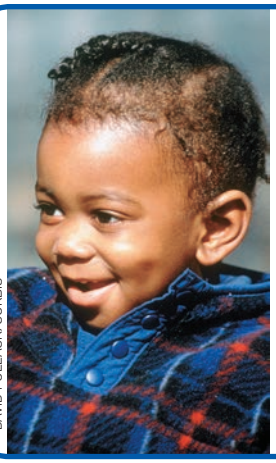
We report results from hundreds of studies in this book. For example, we explore the circumstances under which people are likely to help others, the conditions that set the stage for obedience to an authority, and the situations leading to attachment between parent and child. Much of the research supporting these and other findings was conducted in the United States. Do the findings on helping, obedience, and attachment hold true in other parts of the world? **Cross-cultural research** tests hypotheses on many groups of people to understand whether principles apply across cultures. Psychologists who conduct research from this perspective travel great distances to study people in various settings. Cross-cultural researchers also run studies to obtain data from one cultural group and compare them with data obtained from another (Ernst et al., 2000).

Cross-cultural research often reveals that some psychological principles are *universal,* or true for people of all cultures. For example, all people use language to communicate. But sometimes cross-cultural research indicates that psychological principles or behaviors are true only for people of a certain culture, making them **culture specific,** or *culture bound.* For example, in some cultures it is customary to shake hands when greeting someone, while in others people bow as a greeting gesture.

Some behaviors can be viewed as both universal and culture specific. Suppose you are talking to a new student who has just moved to town. She looks

cross-cultural research Research that tests hypotheses on many groups of people to understand whether principles apply across cultures.

culture specific Principles that are true only for people of a certain culture.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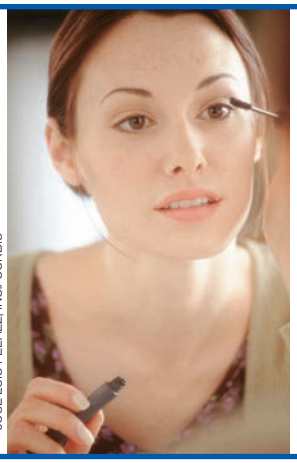
JOSE LUIS PELAEZ, INC./CORBIS

AP PHOTO/ADJ WEDA, POOL

Universal or Culture Specific?

Which of these behaviors would you find in all cultures? Which are culture bound?

down while you're speaking with her, avoiding eye contact. Eye contact is made once or twice, but is quickly broken off. Her behavior seems odd because you are used to looking people straight in the eye when you talk and having them look back at you. You wonder, "Is this person interested in our conversation?" or "Do I seem boring? What is up with her?" Perhaps you are so put off by this behavior that you avoid talking to this student in the future. At the same time, however, the other student is wondering, "Why are you staring at me? Don't you know it's rude to stare at someone while you're talking?" Obviously, the two of you come from different cultures: One culture says looking at someone while you talk is polite, and the other says not looking at someone while you talk is polite. Whether you gaze at the person while speaking is culture specific. However, the motivation behind looking or not looking at someone else, which is the desire to be polite to another while speaking, is more likely a universal principle (Matsumoto, 1994).

Cross-cultural researchers examine everything from language development to emotions and from child-rearing practices to psychological disorders. Let's see what they have to say about personality.

Culture and Personality

Many of the leading personality theorists, including Sigmund Freud, Carl Jung, Abraham Maslow, and Carl Rogers, came from Western civilizations. All four saw personality as a relatively enduring set of behaviors and thought processes, stable over time and in different situations. But some cultures take a different view of personality. Cross-cultural research suggests that the concept of personality is culture bound, tied to the thinking of people in a particular culture (Berry et al., 1992). In some parts of Africa, for example, people use a three-layer model to explain personality, which is different from the theories of Freud and Maslow. The three-layer model assumes that a person's personality will change according to the situation. At the core, the inner layer is spirituality. The second layer, around the core, is psychological strength. The outer layer is physical strength. Combine these layers, add a person's ancestral line, and you have another culture's take on what personality is. What's accepted as an explanation of personality in one culture may not hold true in another.

locus of control People's perception of the source of control over fate or what happens in life: People with an internal locus of control believe they control their fate through their behavior; people with an external locus of control believe their fate is controlled by external circumstances.

Western personality theorists also discuss the individual's **locus of control,** a person's perception of the source of control over fate or what happens in life (Rotter, 1954). Some people have an *external locus of control* (they believe outside forces determine what happens to them) and others have an *internal locus of control* (they believe they control their own fate). Cross-cultural research indicates that culture affects locus of control. Americans and people in other Western nations are far more likely to have an internal locus of control than are their Asian and African counterparts (Dyal, 1984).

Developmental Psychology

Your development from the time you were conceived until this minute has involved physical, cognitive (ways of thinking), and social changes. Not only have you grown bigger and stronger, but you have also learned new ways of thinking and new ways of acting around friends, neighbors, and family. These broad statements are cultural universals, true of all children in all cultures. But how does the particular culture in which we're raised affect our development?

From a young age, we each learn and internalize the rules and patterns of behavior expected in our culture. Part of the socialization process includes learning what it means to be a boy or a girl, as we will explore in greater detail later in this module. But we also learn a wealth of other things, from how to greet an older person to how to play with friends. We learn these rules from such sources as parents, relatives, friends, television, and schools. What we learn depends on where we live, and sometimes we adopt manners and ways specific to a smaller subculture. Perhaps you grew up in a culture where it is appropriate to pray before eating or to cover your head before leaving your home. Adopting these cultural rules helps us feel comfortable, knowing we are meeting the expectations of our group. These paths to comfort all disappear when we find ourselves in a situation with different cultural expectations. What if you grew up in Mexico City and then moved to Colorado at age 15 to start high school? You would have to adapt to a new situation with new cultural norms. It might take you a while to figure out how to fit in and regain your feelings of being comfortable. When a family moves to a new country, the parents often worry that their children will forget "the old ways" and learn new and different manners or behaviors that will not meet with their parental approval. And often their concerns are justified; psychologists know that peer influence is powerful.

Let's turn now to what cross-cultural research can teach us about attachment.

Attachment

In the United States, we typically think of *secure attachment* between infant and caregiver as the ideal bond. But not all cultures share this notion.

A survey of parents in other parts of the world shows that families from countries other than the United States do not necessarily value secure attachment. For example, German parents are more likely to see securely attached infants as "spoiled" (Grossmann et al., 1985). And traditionally raised Japanese infants often show a high degree of what U.S. researchers call "anxious

unsure attachment." Japanese parents tend to prefer this type of attachment, believing that it fosters family loyalty (Miyake et al., 1985). Finally, there is the case of a forest-dwelling tribe, the Efe, who live in West Africa. Efe (sometimes still disparagingly referred to as "pygmies," a name the Efe do not like) parents often spend time away from their infants. They leave the children in the care of a variety of people. Even when in the care of parents, the children can always be seen or heard by around 10 others. Efe children show no emotional deficits despite having multiple caregivers (Tronick et al., 1992).

We need to be aware of the effect of cultural differences on attachment. The attachment pattern we consider "best" in our culture, whether we were born in Japan, Africa, or the United States, may not be best for all people. Different cultures have different values, and their preferred ways of raising children often reflect these values.

Cross-cultural psychology is particularly relevant to the study of development. As David Matsumoto (1994) explains, examining the socialization and development processes of other cultures helps us see who we are and how we developed into the people we are today.

STOCK CONNECTION BLUE/ALAMY

Learning New Rules

Moving from one part of the world to another often means adapting to a culture that is different from the one you grew up with.

PAUSE NOW OR MOVE ON

Turn to page 384 to review and apply what you've learned.

Ethnocentrism

WHAT'S THE POINT?

21-4 What are the effects of ethnocentrism?

You turn on the television and start flipping channels. On one channel, the pope is addressing a large group of people outside the Vatican. On another channel, a parade celebrates Columbus Day. A third channel shows actors imitating past presidents, making these famous leaders look rather foolish. How do you react to these programs? Do you stop and listen to the pope or skip quickly to the next channel? Do you call a brother or sister over to watch the parade, or do you comment on how celebrations of Columbus Day are an insult to the American Indians who lived in the lands Columbus "discovered"? Are you amused or offended by the fun poked at our past presidents? **Ethnocentrism,** the tendency to view the world through our own cultural filters, will surely affect your reactions. Ethnocentrism is not necessarily a bad or a good thing—it is just a reflection of the way we view the world. We all look at the world through cultural filters.

ethnocentrism The tendency to view the world through your own cultural filters.

Our ethnocentrism shows up in the spoken and unspoken rules we live by and expect of others. When someone behaves in a way we do not consider socially appropriate or "normal," we react negatively. Those who do not wear black clothing every day may avoid those who do, labeling them goths, for example, or perhaps even making jokes at their expense. The sophomore who parks a car in the lot designated for juniors and seniors may cause anger and frustration, especially if an older student can't find a place to park.

As you might predict, we seem to have the strongest negative reactions to people coming from cultures different from our own. We may find refugees who have moved to the United States from war-torn parts of the world "peculiar" because of their dress or mannerisms. In the United States it is common for people to take baths or shower every day, so citizens born here may be quickly offended when someone from another country unknowingly violates this cultural rule.

If people behave according to our cultural expectations, we say, "You all are good." But when others behave in ways we do not expect, or that are contrary to our beliefs, then we are more likely to think of these people as bad or weird. The problem is, our ethnocentrism makes us susceptible to making snap judgments about others that may not be fair or even true. (For more on becoming aware of your own ethnocentrism, see Psychology in the Real World: Acknowledging Ethnocentrism.)

Cultural conflicts will not disappear simply because we are aware of and study them. But we are better equipped to understand cultural differences when they occur if we have studied the importance of culture. Studying culture builds respect for, and appreciation of, all the cultural differences we will encounter in our everyday lives. Psychologists today are indeed more sensitive to culture's effect on experimental results and build measures into their studies that help ensure meaningful results. Cross-cultural psychologists hope to continue their work toward discovering both universal and culture-specific results in an ongoing effort to broaden our view of the field of psychology.

Now let's take a look at gender, another fundamental way in which we differ.

PAUSE NOW OR MOVE ON

Turn to page 385 to review and apply what you've learned.

Culture and Gender

WHAT'S THE POINT?

21-5 What is gender, and what factors influence our gender identity?

The moment you were conceived, your sex was genetically determined. Whether you were going to be a boy or a girl was set by a single chromosome, as just 1 out of 46 that is either distinctly male or female. Girls, you received

Psychology in THE REAL WORLD

Acknowledging Ethnocentrism

Although we are all ethnocentric to some degree, many of us are not aware of our ethnocentric tendencies. If you are unaware of your cultural filters, you are likely to develop *inflexible ethnocentrism,* which inevitably leads to problems in our multicultural world. Your inability to see beyond your cultural filters may create a wall between you and those who have different cultural viewpoints. Inflexibility discourages us from learning about other cultures in our states, cities, and schools. To counter these tendencies, David Matsumoto (1999) suggests trying to establish a *flexible ethnocentrism* when interacting with others. Flexible ethnocentrism has the following goals (adapted from Ernst et al., 2000):

1. Accept that we are all ethnocentric and that our cultural filters vary.
2. Realize that our cultural filters can distort reality so that we see things only in a certain way.
3. Recognize and appreciate that people of different cultural backgrounds produce their own distortions of reality.
4. Learn to deal with our emotions and our judgments of morality and personality as a result of ethnocentrism.

How do you achieve that fourth goal? First, if you believe a negative initial reaction to someone may be caused by your own limiting ethnocentrism, try to put your emotional reactions on hold. Next, try to learn the other person's viewpoints. Finally, do not assume that you need to abandon your cultural filters to avoid inaccurate perceptions of others. Increasing your knowledge of other cultures allows you to *add* to your own filters, helping you see things from many perspectives.

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Flexible Ethnocentrism

Moving beyond your initial, emotional reaction is an important step in understanding people from cultures different from your own.

an *X chromosome* from your father to pair with the X your mother passed to you. Boys? You received a *Y chromosome* from your father instead of another X. Genetically speaking, girls and boys are actually far more similar than they are different.

Of course, biological differences between the sexes appear throughout the journey from birth to adulthood. Girls typically enter puberty two years earlier than boys and women outlive men by five years. Boys have more muscle and are, on the average, several inches taller than girls by the time they are done growing. Females are twice as likely to be diagnosed with depression. Boys are far more likely to be diagnosed with ADHD (attention deficit/hyperactivity disorder). Such biological differences exist, but not all differences between boys and girls are due to genetics. **Gender** is our definition of male and female, based on socially and culturally influenced characteristics as well as biology.

gender Our definition of male and female, based on socially and culturally influenced characteristics, as well as biology.

gender role A set of expected behaviors for males or for females.

gender identity Our sense of being male or female.

Whereas a person's sex is determined genetically, his or her **gender role** is a result of culture. Gender role is a set of expected behaviors for males or for females. Your sense of being either a male or a female is your **gender identity,** and your gender role arises from it. So, how much of your gender role is due to society's expectations, and how much is influenced by biology? We can begin to explore the answer to this question by looking at gender roles inside and outside the home and at an example of a biological influence.

When I was born, my aunt and uncle gave me a shirt that said "Little Slugger" on the front. The same aunt and uncle gave my sister a little doll and a pink shirt that said "Princess." Clearly, gender expectations are expressed by friends and relatives at a very early age, based on whether the doctor announces, "It's a boy!" or, "It's a girl!" upon birth. I'm no longer a "little slugger," but in my home, if wood needs to be chopped and stacked for the fireplace, I chop and stack it. I enjoy cooking, but when my girls were young, most of our family dinners were prepared by my wife. We also tried to share child-care duties equally, but I rarely bought our children clothing or took them to the doctor when they were sick. On this small, household scale, we all often behave in ways society says are appropriate, based on accepted gender roles. Is there a biological influence? Well, yes. I have more muscle mass, am stronger, and can chop wood more quickly and efficiently. So, our genetics did not determine who would cook or chop, but it influenced the culture we grew up in, which socialized us to believe that these roles are primarily male or female oriented.

Outside the home, gender roles play out on a much larger scale. Politically, over 80 percent of the world's nationally elected governing leaders are male (IPU, 2009). Of course, we need to keep this in perspective. When the twentieth century began, New Zealand was the only country in the world where women could cast ballots in national elections. Women were not allowed to vote in the United States—let alone hold office—until 1920. Holding office in the U.S. Congress started out as a "males only" club, but after the 2010 election, 17 of the 100 U.S. senators were women. This number denotes progress since 1920 but also shows how far our country is from electoral equality of the sexes.

Fewer Barriers

Roles for women are not as limited as they were when your parents were born.

SSGT STACY L PEARSALL, USAF

Men are more physically aggressive than women (Bettencourt & Kernahan, 1997). The aggression center in all human brains, the *amygdala,* is activated by

the hormone testosterone, which is found in greater concentration in males. Does this biological difference show up in behavior? *Yes.* For instance, hunting is an aggressive act, and over 90 percent of the hunting permits issued in my state go to men. Fighting war is primarily a male activity (Wood & Eagly, 2007). It's not that women can't physically pull a trigger. We have seen that on former Alaska governor Sarah Palin's reality show. But culturally, men get the message that loading and firing a gun, whether for killing game or fighting in a war, is acceptable and in some cases encouraged. Perhaps the tendency to be more aggressive in the first place is a big reason why men outnumber women in the U.S. Army by about nine to one (U.S. Army, 2009).

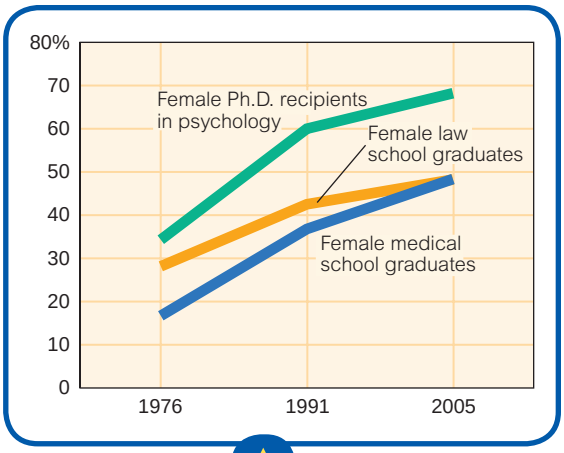


Figure 21.1
Women and the Professions

Law, medicine, and psychology have been attracting more and more women. (From Cynkar, 2007.)

Socially, girls are more likely to play in a small group or with a single friend, while boys are often involved in a large group with a competitive (or aggressive) focus (Rose & Rudolph, 2006). Females in their mid- to late teens are more likely to spend time on Facebook than same-aged males, taking more time to connect socially (Pryor et al., 2007). Men are more likely to use conversations to solve problems, while women tend to explore relationships in similar conversational settings (Tannen, 1990).

Let's take a moment to note, however, that whether in the workplace or in Congress, gender roles are forever evolving. The year I started high school (1976, for those keeping track), fewer than 20 percent of medical school graduates were women. Today, virtually half of med school grads are women. As you can see from **Figure 21.1,** the number of women graduating from law school or from Ph.D. psychology programs has also risen dramatically in the past 30 years. What's considered acceptable or even expected of males and females shifts over time. Power and status, whether you are former president Bill Clinton or secretary of state Hillary Clinton, are more important these days than brute strength and illustrate how both men and women are viewed as fully "capable of effectively carrying out organizational roles at all levels" (Wood & Eagly, 2002, p. 722).

Culture and Gender

Learning to appreciate the ways we are different helps us understand and respect other people's behaviors, attitudes, and traditions.

So, the answer to the question of whether it's biology or culture (nature or nurture) that influences who we are is to be found by combining the two. Nature creates the biological differences (for example, the way testosterone affects the brain's aggression center), while cultural expectations amplify such differences. Our tendency is to fill the role, both in terms of our culture and our gender, that society supports. That said, we are human beings, not robots. Cultural influences like peer pressure or examples in the media can sometimes push us toward behaving inappropriately, but we are built to make choices. The decisions you make today will influence your environment tomorrow. Hopefully, your culture will help you make the right decisions.

MICHAEL NEWMAN/PHOTOEDIT, INC.

PAUSE NOW OR MOVE ON

Turn to page 385 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 21

Thinking About the Psychology of Culture and Gender

Culture

WHAT'S THE POINT?

21-1 What is culture, and what factors influence how cultures develop?

- Culture is the shared attitudes, beliefs, norms, and behaviors of a group communicated from one generation to the next.
- At least four factors influence culture development and diversity: population density, climate, natural resources, and technology.

Apply What You Know

1. What is another word for what David Matsumoto describes as "the software of our minds"?
2. Teamwork is a necessity in areas of the world where resources are scarce. Groups of people who develop social rules that encourage cooperation are more likely to survive in these areas. This is an example of how _____ can influence _____ development.

Individualism and Collectivism

WHAT'S THE POINT?

21-2 What are the effects of individualist and collectivist cultures on sense of self, achievement motivation, and emotional perceptions?

- Individualist cultures place personal goals or needs ahead of group goals or needs, which gives people an independent sense of self. Collectivist cultures place group goals or needs ahead of personal goals or needs, which gives people an interdependent sense of self.
- Achievement motivation refers to this desire to excel and is a product of cultural environment. Individualist cultures view achievement as an individual triumph, and collectivist cultures view achievement in relation to enhancing a family's social standing.
- Culture affects our display of emotion and our perception of it in collectivist and individualist cultures.

Apply What You Know

3. A person who stays at home to care for his aging parents instead of accepting a scholarship to college may be expressing what aspect of culture?
   a. collectivism
   b. independent self-concept
   c. achievement motivation
   d. individualism
4. What kind of culture tends to value achievement motivation highly?
   a. collectivist
   b. individualist
   c. resource rich
   d. densely populated

Culture and Personality, Development, and Attachment

WHAT'S THE POINT?

21-3 How does culture influence personality, development, and parent-child attachment?

- Cross-cultural research suggests that the concept of personality is culture bound, or tied to the thinking of people in a particular culture.
- Americans and people in other Western nations are more likely than their Asian and African counterparts to have an internal locus of control.
- The socialization process involves learning and internalizing the rules and patterns of behavior (cultural norms) expected in our culture.
- Culture influences the type of attachment that is valued and develops between parents and children.

Apply What You Know

5. After receiving the highest score on a test, Reesa said, "I studied hard and made sure I got a lot of sleep the night before." Reesa's explanation demonstrates that she has

   a. a collectivist sense of her achievement.
   b. a culture-specific idea about intelligence.
   c. an external locus of control.
   d. an internal locus of control.

6. According to the research presented, which statement about parent-child attachment styles is most accurate?

   a. Attachment is universal: Cultures around the world value the same things about the attachment between parents and children.
   b. Attachment is individualist: Cultures that value the individual over the group value parent-child attachment more.
   c. Attachment is culture specific: Different cultures think differently about what is the best kind of parent-child attachment.
   d. Attachment is collectivist: Cultures that value the group over the individual value parent-child attachment more.

Ethnocentrism

WHAT'S THE POINT?

21-4 What are the effects of ethnocentrism?

- Ethnocentrism is the tendency to view the world through our own cultural filters. When someone behaves in a way we do not consider socially appropriate or "normal," we react negatively.
- Studying culture builds respect for, and appreciation of, all the cultural differences we will encounter in our everyday lives.

Apply What You Know

7. A hand gesture that means something in one culture but something different in another culture is an example of a _____ kind of behavior.

   a. culture-specific
   b. individualist
   c. universal
   d. locus-of-control

8. Accepting that we are all ethnocentric and that our cultural filters can distort reality is called _____ ethnocentrism.

Culture and Gender

WHAT'S THE POINT?

21-5 What is gender, and what factors influence our gender identity?

- Gender is our definition of male and female, based on socially and culturally influenced characteristics, as well as biology.
- While sex is determined genetically, our gender roles are a result of culture. Biology and culture are both important in defining our gender identities.
- Gender roles change over time and across cultures.

Apply What You Know

9. What is the name of the brain's aggression center?

10. Men are more likely to use conversations to _____, while women tend to use conversations to _____.

KEY TERMS AND KEY PEOPLE

culture, p. 372
individualism, p. 374
collectivism, p. 374
cross-cultural research, p. 376
culture specific, p. 376
locus of control, p. 378
ethnocentrism, p. 379
gender, p. 381
gender role, p. 382
gender identity, p. 382
David Matsumoto (1959–), p. 372

DOMAIN 5

Cognition

Memory

MODULE 22 Information Processing

MODULE 23 Forgetting and Memory Construction

Thinking and Intelligence

MODULE 24 Thinking

MODULE 25 Intelligence and Intelligence Testing

A tremendous amount of psychology takes place "between your ears." Other domains have focused on the biological, developmental, and social foundations that enable thinking-related cognitive processes. Now we move on to the cognitive processes themselves. Within the Cognition Domain, the topics are amazingly diverse, and fundamental issues are at stake. In thinking about memory, for example, how does an airline pilot store and retrieve the proper sequence of steps for taking off and landing safely? How can you possibly remember everything you need to know for your next psychology test? We also examine memory failure, the times we either forget or misremember information. Then we broaden our understanding of cognition by turning our attention to thinking and intelligence. How do we conceptualize our world? How do we solve problems, and why do we sometimes stumble in the process? What do we really mean when we speak of intelligence, and how can we measure this elusive quality? These are but a few of the issues we consider in the next modules. There is plenty to think about!

Memory

MODULES

22 Information Processing

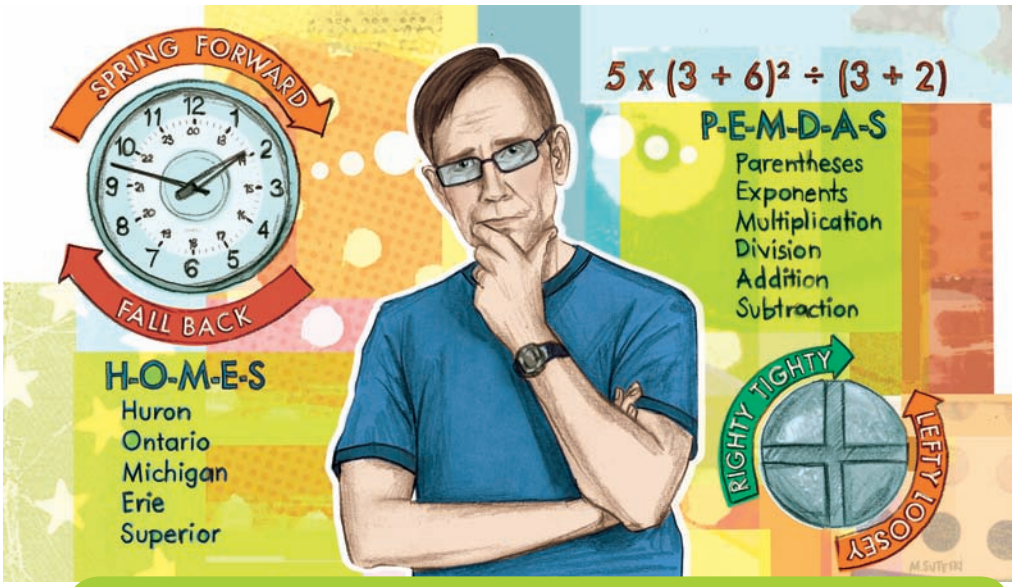
23 Forgetting and Memory Construction

Now, where did I leave those car keys? Dang! Why can't I ever remember what I was supposed to pick up at the grocery store? And why do I forget lists and keys, but not when my favorite TV show is on or the route I follow to school? (In fact, I can follow that route to school without even thinking about it!) And what about the accuracy of memories? Sometimes my twenty-something son and I have entirely different memories of an event we experienced together. We can't both be right, yet we both sincerely believe we are. How can that be explained?

The following two modules on memory will answer these questions and more. We will look at how memories are processed, from encoding (getting the information into memory) to storage (tucking the information away) to retrieval (getting it back when you need it). We'll also examine how memory can fail and be inaccurate. We hope you find it memorable!

MODULE 22

Information Processing



I bet you've seen memory tricks like these. The technical term for them is *mnemonic devices*. As you will see in this module, they are an excellent strategy for encoding information into our memory. Because the information is so effectively encoded, retrieval of the memory is easy. This module is filled with practical information for improving your memory.

Encoding
- Automatic Processing and Effortful Processing
- Serial Position Effect
- Spacing of Rehearsal
- Encoding Meaning
- Encoding Imagery
- Mnemonic Devices
- Organizing Information

Storage
- Sensory Memory
- Short-Term/Working Memory
- Long-Term Memory
- Memory and the Brain
- Explicit and Implicit Memories

Retrieval
- Context
- State Dependency

Information processing enables memory, a cognitive skill so important that it's impossible to imagine life without it. Before leaving for school this morning, I need to remember to let the dog out. I also need to remember to put the student papers I read last night into my briefcase and bring some ground beef up from the freezer for tonight's dinner. As I sit here working, I can remember details from my recently completed weekend. The football game I saw on television was close enough to hold my attention all the way to the end. My wife and I went to a pretty good movie on Saturday. On Friday, my recreational league volleyball team won two of three games in a hotly contested match. I actually got both feet off the ground at once to spike the ball a couple of times!

We rely on memory all the time, and not just for the details of our daily lives. I need to remember who I am and what I stand for. I need to remember the norms our

encoding The process of getting information into the memory system.

storage The retention of encoded information in memory over time.

retrieval The process of getting information out of memory storage.

society has developed—the "proper" rules for behavior: what to do with my trash, how to order a meal in a restaurant, which side of the hall to walk on, and a thousand other guidelines that let us coexist in a complex society. I also need to remember how to cook, how to reconcile my credit card statement, how to wash my clothes, and how to program the alarm on my cell phone. And, though I am not consciously aware of it, I even need to remember the meanings of words in my language and the processes necessary for walking or standing upright.

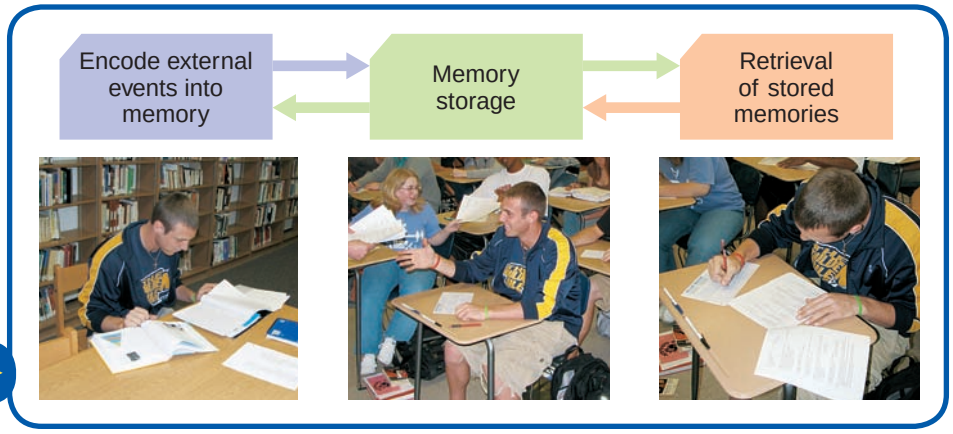
In this module, we focus on memory, using an updated version of a classic information-processing model (Atkinson & Schiffrin, 1968). There are certainly differences between how a human brain works and how a computer works, but they both process information in three basic steps (see **Figure 22.1**):

1. **Encoding,** or getting information into the memory system
2. **Storage,** or retaining information in memory over time
3. **Retrieval,** or getting information out of memory storage

We can look at how these three steps work for computers as they process information.

First, nothing happens unless you can *encode* information or get it into the computer. There are various options for doing this, but two common devices for encoding information are keyboards and Internet connections. Once encoded, the information must be retained in *storage.* Computers offer two kinds of storage, one temporary and the other more permanent. Temporary storage takes place in the active memory of the computer that keeps the various applications open on your screen. You know how temporary this memory is if you've ever briefly lost power while working on a project. More permanent storage is available on the computer's hard drive. This storage can even survive the computer's "loss of consciousness" when it's turned off. But all this encoding and storage would be useless if you couldn't *retrieve* information from storage. If you're careful about setting up folders and subfolders, this can be a snap. If you're not careful, you can lose documents. You may know that you've stored your English paper, but if you can't recall what you named it or the folder in which you placed it, then you won't be able to retrieve it easily.

Humans also encode information. Instead of a modem or a keyboard, we use our senses to gather information. Then we must store the information, either temporarily or permanently. Finally, we must gain access to the memories we have permanently stored. Let's take a more detailed look at these three steps in the human system.



PHOTOS: CHARLES T. BLAIR-BROEKER

Figure 22.1
The Information-Processing Model of Memory

Students in my classroom demonstrate that memories are processed through three stages. Encoding brings information into the memory system. Storage allows us to retain the information over time. Retrieval brings the information back out of memory.

Encoding

WHAT'S THE POINT?

22-1 What are the factors that allow us to effectively encode information into our memory system?

Encoding is the process in which you move information—the raw material, the "stuff" that you will remember—into your memory system. Good students are invariably good encoders of information. Fortunately, we can control several factors that influence how well we encode information. In this section we examine the following:

- The role of effort in encoding
- The effect of the order of the information on encoding, known as the serial position effect
- The significance of how you space out the rehearsal of the information to be encoded
- The huge contribution of the meaning of information to be encoded
- The effectiveness of encoding visual images
- The use of mnemonic devices, or memory tricks
- The importance of organizing information to be encoded

Have you ever noticed that committing items to memory sometimes takes a heck of a lot of work? That brings us to our first topic, the distinction between automatic and effortful processing of information.

Automatic Processing and Effortful Processing

Automatic processing is the unconscious process of encoding certain information without effort. Have you ever had the experience of taking a test and being able to remember exactly *where* in your textbook the information is but not being able to remember the more important bit of *what* the information is? That's because we encode place information automatically (probably because it provides an evolutionary advantage—it's important to remember where threats in the environment came from, for example). We also tend to encode information about time and frequency automatically.

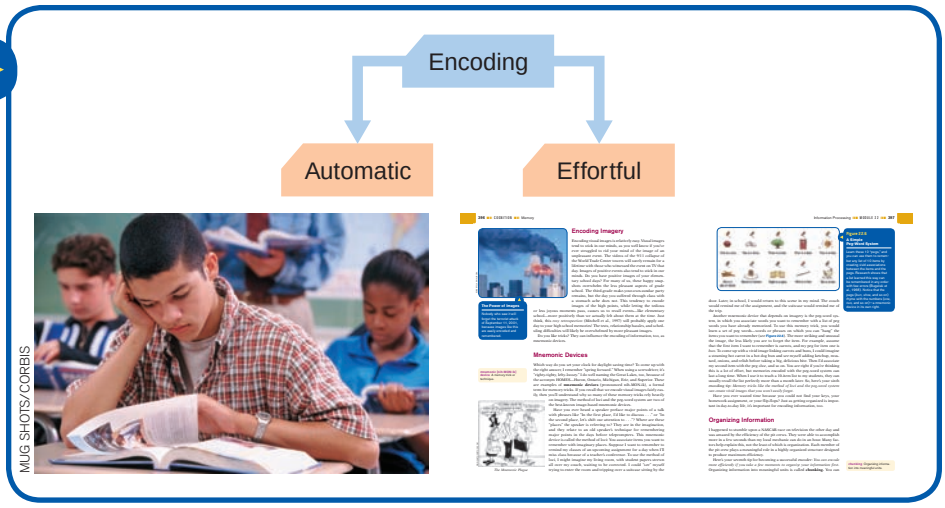
Well-learned information can be processed automatically. (Compare how easily you can process information in a video game that you have played hundreds of times with how difficult it was to keep track of everything going on the first few times you played). Unfortunately, when you're trying to learn the content of your textbook you don't usually automatically capture *what* is written there. To master that information, you must engage in **effortful processing,** encoding that requires attention and conscious

automatic processing The unconscious and effortless process of encoding information such as space, time, and frequency.

effortful processing Encoding that requires attention and conscious effort.

Figure 22.2
Automatic Processing and Effortful Processing

Thanks to automatic processing, this student may be able to remember where in his textbook he found the information he needs to study with no effort. But he will have to pay attention and use effortful processing to encode the information he's trying to learn from the book.



MUG SHOTS/CORBIS

rehearsal The conscious repetition of information.

effort (see **Figure 22.2**). Research indicates that some processing strategies are more effective than others, and the most important one seems to be **rehearsal,** the conscious repetition of information.

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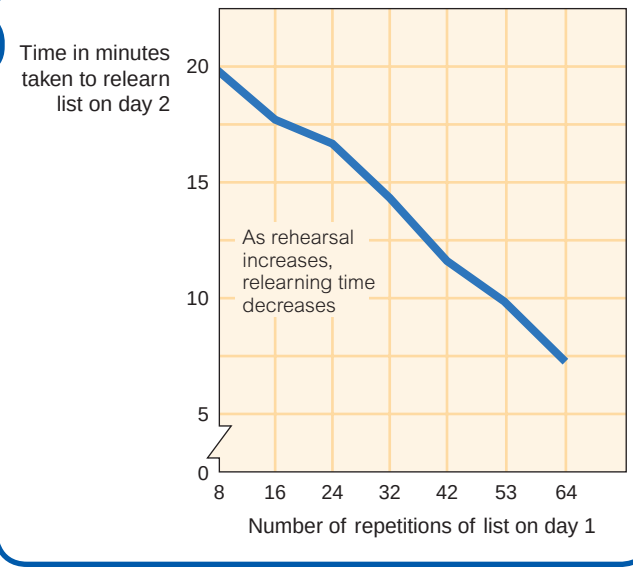
HERMANN EBBINGHAUS (1850–1909) German philosopher who conducted pioneering memory studies.

Hermann Ebbinghaus taught us much of what we know about the importance of rehearsal (which is another word for practice). Ebbinghaus, a nineteenth-century German philosopher, wanted data to support his ideas about memory. To obtain those data, he spent a considerable amount of time memorizing lists of three-letter nonsense syllables. If this sounds like nonsense to you, keep in mind that Ebbinghaus wanted to memorize only unfamiliar items. His major conclusion? The more you rehearse, the more you retain (see **Figure 22.3**). Practice, indeed, does make perfect. Here's your first tip for becoming a good encoder: *The more time you invest in rehearsing information, the more effective your memory will be.*

Another effective processing strategy is overlearning—continuing to rehearse information even after you have memorized it. Students who play musical instruments know they should continue to practice pieces that they

Figure 22.3
Rehearsal and Retention

Hermann Ebbinghaus discovered that the more times he rehearsed a list on the first day, the less time it took to be able to repeat the list with no errors on the second day. (From Baddeley, 1982.)



can already play without error. And gymnasts know that they must continue to rehearse mistake-free routines to give their best performances in competition. Overlearning is just as important for school-related information. So, here's your second tip: *Continue to rehearse academic information even after you think you have it mastered.* This is one of the best ways to make sure the information is available under stressful test conditions.

Without question, then, rehearsal is important. It's not the only factor that influences encoding, however. Let's turn our attention to the serial position effect and see how the order of presented information affects encoding.

serial position effect The tendency to recall the first and last items in a list more easily.

Serial Position Effect

How many times have you taken a test in which you had to remember a list of items? Probably a lot. At such times, the **serial position effect**—the tendency to recall the first and last items on the list more easily—comes into play. Chances are good that you struggled most with recalling the middle items (see **Figure 22.4**). You may also have experienced the serial position effect if you were introduced to a dozen new people at a party. By the end of the evening, which ones were you most likely to remember? The folks you met first and last. Each of these conditions has its own term:

- The *primacy effect* enhances our ability to recall items near the beginning of a list. We have more opportunities to rehearse those first items. Memory researchers who want to minimize the primacy effect may present the list of items quickly, thus eliminating the opportunity to rehearse between items.
- The *recency effect* enhances our ability to recall items near the end of a list. The most recent items are freshest in memory. Memory researchers who want to eliminate the recency effect will delay recall or distract the memorizer by asking several unrelated questions ("What is your zip code?") between presenting the final items and asking people to recall the list (Craik & Watkins, 1973).

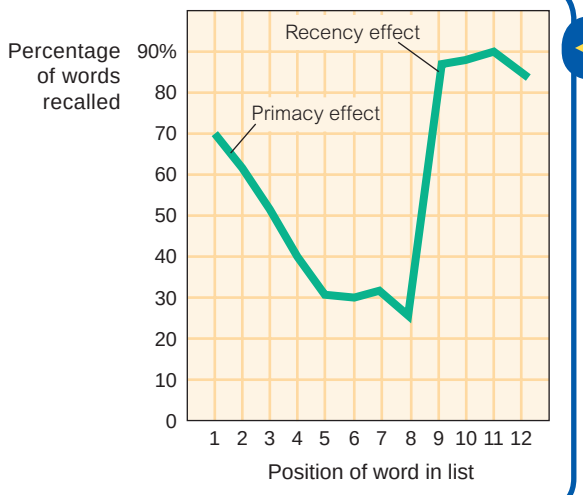


Figure 22.4
The Serial Position Effect

People given a list of items and later asked to recall the items had little trouble remembering the first few items (the primacy effect) and the last few items (the recency effect). The hardest items to recall are those in the middle. (From Craik & Watkins, 1973.)

Here is your third tip: *Devote extra rehearsal time to the middle of lists you must memorize.* However, it's not just the amount of rehearsal that's important. Our next topic shows that how you divide the rehearsal up matters, too.

Spacing of Rehearsal

The effectiveness of rehearsal depends on when you do it. More than 300 experiments on the spacing of rehearsal (Cepeda et al., 2006) show *distributed rehearsal*—or spread-out sessions—works better than *massed rehearsal,* rehearsal packed together into fewer, longer sessions (cramming). Consider the way performers practice. Do actors or musicians mass all their rehearsals for the week into a single, daylong session? *No,* because as the performers tire, additional rehearsal becomes less valuable. So, here's your fourth tip: *If you cram all your studying into one long session the night before an exam, then you will not encode the information as effectively as you would if you spaced your study time fairly evenly throughout the unit.* Even if you somehow manage to put in as many hours, you won't learn as much per hour. The research about distributed rehearsal is one of the most powerful arguments for the use of comprehensive final exams—reviewing the material from a course throughout the semester will enhance *lifelong* retention of the material (Bahrick et al., 1993). And, speaking of final exams, there is evidence that if you continually quiz yourself on the material you are studying, the effectiveness of those distributed study sessions increases significantly (Roediger & Karpicke, 2006). By self-testing, you make sure you are actively involved with the material.

Now let's turn to one of the most important encoding factors. Once, when I was a high school junior, my English teacher made our class memorize a section of Chaucer's *Canterbury Tales* in its original Middle English. I had a horrible time with this task because I didn't know how most of these Middle English words translated into modern English. As we're about to learn, meaning matters.

Encoding Meaning

Rehearsal is central to encoding, but what's also important is how meaningful the information is. You might well think of rehearsal and how meaningful the information is as the twin pillars of encoding. If you're interested in cutting down the amount of time you spend in rehearsal (and what student isn't?), then your most effective option is to make the material meaningful, a process known as **semantic encoding.**

Research shows that when we encode according to meaning, we remember more effectively than when we encode either sounds *(acoustic encoding)* or images *(visual encoding).* In one experiment, researchers flashed words to participants and then followed with questions that led to semantic, acoustic, or visual processing of information (see **Figure 22.5**). For example, to make participants process acoustically, the researchers might ask whether

semantic encoding Encoding of meaning.

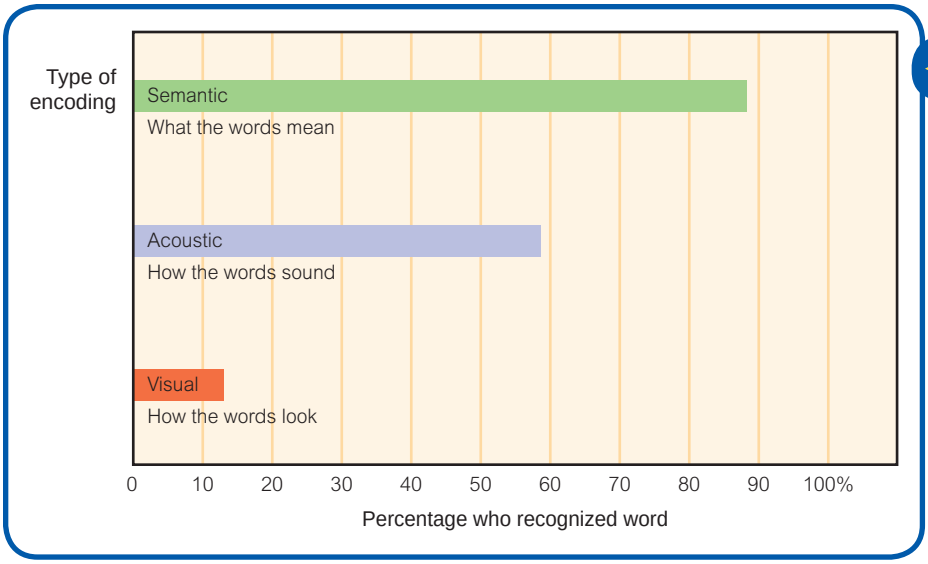


Figure 22.5
The Advantage of Semantic Encoding

This graph shows the results of a study in which researchers flashed words and caused people to process the words according to their meaning (semantic encoding), sound (acoustic encoding), or image (visual encoding). They found that people were most likely to remember the words if they had considered their meaning. (From Craik & Tulving, 1975.)

the flashed word rhymed with another word. To promote semantic encoding, researchers would ask whether the flashed word would make sense in a particular sentence. The participants remembered better when they had encoded the material semantically (Craik & Tulving, 1975). We now know that each of these types of encoding uses a different part of the brain (Poldrack & Wagner, 2004).

Ebbinghaus himself estimated that it was *10 times* harder to learn nonsense syllables than meaningful material. This is why it is wise to search for meaning. So, here is your fifth tip: *One good way to add meaning to material is to use the self-reference effect by relating it to your own life.* Physics students in my school spend a day each spring at the amusement park. The principles of physics that make the rides both exciting and safe are somehow more meaningful—and memorable—when you're twisting through space on the roller coaster. Of course, you don't have to go to the amusement park to take advantage of this. If you can think about and imagine such connections, then any material will be encoded and remembered more effectively (Symons & Johnson, 1997). This is especially true in Western cultures like the United States, where there is a strong emphasis on the importance of the individual (Wagar & Cohen, 2003). And meaningful connections are particularly easy to find in a psychology course because the subject matter—behavior and mental processes—relates to *you*.

When it comes to encoding, the old expression that a picture is worth a thousand words holds a great deal of truth. Can you picture the Rocky Mountains? The White House? Johnny Depp? Let's look at the relationship between images and encoding.

Practice Makes Perfect!

Whether in sports, music, or academics, more rehearsal leads to better performance.

IMAGE SOURCE/ALAMY IMAGES

ROBERT CLARK/AURORA

The Power of Images

Nobody who saw it will forget the terrorist attack of September 11, 2001, because images like this are easily encoded and remembered.

Encoding Imagery

Encoding visual images is relatively easy. Visual images tend to stick in our minds, as you well know if you've ever struggled to rid your mind of the image of an unpleasant event. The videos of the 9/11 collapse of the World Trade Center towers will surely remain for a lifetime with those who witnessed the event on TV that day. Images of positive events also tend to stick in our minds. Do you have positive images of your elementary school days? For many of us, these happy snapshots overwhelm the less pleasant aspects of grade school. The third-grade make-your-own-sundae party remains, but the day you suffered through class with a stomach ache does not. This tendency to encode images of the high points, while letting the tedious or less joyous moments pass, causes us to recall events—like elementary school—more positively than we actually felt about them at the time. Just think, this *rosy retrospection* (Mitchell et al., 1997) will probably apply one day to your high school memories! The tests, relationship hassles, and scheduling difficulties will likely be overwhelmed by more pleasant images.

Do you like tricks? They can influence the encoding of information, too, as mnemonic devices.

Mnemonic Devices

mnemonic [nih-MON-ik] device A memory trick or technique.

Which way do you set your clock for daylight saving time? To come up with the right answer, I remember "spring forward." When using a screwdriver, it's "righty-tighty, lefty-loosey." I do well naming the Great Lakes, too, because of the acronym HOMES—Huron, Ontario, Michigan, Erie, and Superior. These are examples of **mnemonic devices** (pronounced nih-MON-ik), a formal term for memory tricks. If you recall that we encode visual images fairly easily, then you'll understand why so many of these memory tricks rely heavily on imagery. The method of loci and the peg-word system are two of the best-known image-based mnemonic devices.

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The Mnemonic Plague

Have you ever heard a speaker preface major points of a talk with phrases like "In the first place, I'd like to discuss . . ." or "In the second place, let's shift our attention to . . ."? Where are these "places" the speaker is referring to? They are in the imagination, and they relate to an old speaker's technique for remembering major points in the days before teleprompters. This mnemonic device is called the method of loci: You associate items you want to remember with imaginary places. Suppose I want to remember to remind my classes of an upcoming assignment for a day when I'll miss class because of a teacher's conference. To use the method of loci, I might imagine my living room, with student papers strewn all over my couch, waiting to be corrected. I could "see" myself trying to enter the room and tripping over a suitcase sitting by the

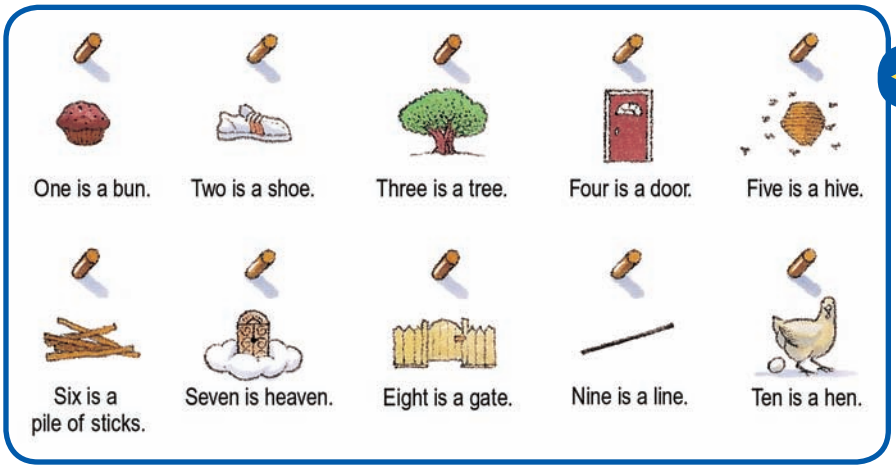

One is a bun.
Two is a shoe.
Three is a tree.
Four is a door.
Five is a hive.
Six is a pile of sticks.
Seven is heaven.
Eight is a gate.
Nine is a line.
Ten is a hen.

Figure 22.6
A Simple Peg-Word System

Learn these 10 "pegs," and you can use them to remember any list of 10 items by creating vivid associations between the items and the pegs. Research shows that a list learned this way can be remembered in any order with few errors (Bugelski et al., 1968). Notice that the pegs (*bun*, *shoe*, and so on) rhyme with the numbers (*one*, *two*, and so on)—a mnemonic device in its own right.

door. Later, in school, I would return to this scene in my mind. The couch would remind me of the assignment, and the suitcase would remind me of the trip.

Another mnemonic device that depends on imagery is the peg-word system, in which you associate words you want to remember with a list of peg words you have already memorized. To use this memory trick, you would learn a set of peg words—words or phrases on which you can "hang" the items you want to remember (see **Figure 22.6**). The more striking and unusual the image, the less likely you are to forget the item. For example, assume that the first item I want to remember is carrots, and my peg for item one is *bun*. To come up with a vivid image linking carrots and buns, I could imagine a steaming hot carrot in a hot dog bun and see myself adding ketchup, mustard, onions, and relish before taking a big, delicious bite. Then I'd associate my second item with the peg *shoe*, and so on. You are right if you're thinking this is a lot of effort, but memories encoded with the peg-word system can last a long time. When I use it to teach a 10-item list to my students, they can usually recall the list perfectly more than a month later. So, here's your sixth encoding tip: *Memory tricks like the method of loci and the peg-word system can create vivid images that you won't easily forget.*

Have you ever wasted time because you could not find your keys, your homework assignment, or your flip-flops? Just as getting organized is important in day-to-day life, it's important for encoding information, too.

Organizing Information

I happened to stumble upon a NASCAR race on television the other day and was amazed by the efficiency of the pit crews. They were able to accomplish more in a few seconds than my local mechanic can do in an hour. Many factors help explain this, not the least of which is organization. Each member of the pit crew plays a meaningful role in a highly organized structure designed to produce maximum efficiency.

Here's your seventh tip for becoming a successful encoder: *You can encode more efficiently if you take a few moments to organize your information first.* Organizing information into meaningful units is called **chunking.** You can

chunking Organizing information into meaningful units.

Figure 22.7
Effectiveness of Chunking

Give yourself 10 seconds to learn the letters in row 1. How well did you do? Now try row 2. Did you do any better? The identical letters appear in both rows, but they are easier to encode if they are chunked, or organized into meaningful units—in this case, into words and then into a meaningful sentence.

ROW 1 RNN TYW KTYU ACDF OAHNSOO RTA UO UCR OYO

ROW 2 ASK NOT WHAT YOUR COUNTRY CAN DO FOR YOU

encode many more letters if they are organized into meaningful words and sentences than you can if they are just randomly grouped (see **Figure 22.7**).

Organizing information into a *hierarchy* is another effective encoding technique. Hierarchies are organizational systems that focus on the relationships between pieces of information. The most familiar example of a hierarchical organization is an outline, which you've probably done for papers or other assignments. By indenting subpoints beneath main points, you get a sense of how each piece of information relates to the rest of the information. Chemistry's periodic table of elements is another example of hierarchical organization. It is so central to the field that it hangs on the wall of every chemistry classroom and is printed inside the cover of every chemistry textbook. Each row and column provides specific meaning to help the user know how the elements relate to one another.

So, did you encode all those tips we gave you on becoming a better encoder? If you need to rehearse them, read through the list in Thinking About Positive Psychology: Tips for Becoming a Better Encoder.

Thinking About POSITIVE PSYCHOLOGY

Tips for Becoming a Better Encoder

The goal of positive psychology is to achieve optimal human functioning. A good memory helps you function better and make fewer mistakes in virtually every aspect of day-to-day life. It's important to realize that almost everyone can improve memory skills by applying the principles of encoding that we have discussed in this module.

Here, in one place, are the seven encoding tips that have been presented. Think about each one in relation to your own study skills. Are there a couple you can focus on to improve your memory and become a better student?

1. *Rehearse*—The more time you invest in rehearsing, the more effective your memory is going to be.
2. *Overlearn*—Continue to rehearse academic information even after you think you have it mastered.
3. *Overcome the serial position effect*—Devote extra rehearsal time to the middle of lists you must memorize.
4. *Benefit from the spacing effect*—If you cram all your studying into one long session the night before an exam, you will not encode the information as effectively as you would if you spaced your study time fairly evenly throughout the unit.
5. *Take advantage of the self-reference effect*—One good way to add meaning to material is to relate it to your own life.
6. *Use mnemonic devices*—Memory tricks like the method of loci and the peg-word system can create vivid images that you won't easily forget.
7. *Chunk material or arrange it in a hierarchy*—You can encode more efficiently if you take a few moments to organize your information first.

PAUSE NOW OR MOVE ON

Turn to page 409 to review and apply what you've learned.

Storage

WHAT'S THE POINT?

22-2 What distinguishes sensory, short-term/working, and long-term memories?

Storage is the retention of information, the very core of memory. Humans have three distinct storage systems, each with a different degree of permanence. We will deal with them in order from least permanent to most permanent: sensory memory, short-term/working memory, and long-term memory. Next we will look at how your brain stores long-term memories and then explore explicit and implicit memories.

Sensory Memory

Our senses are constantly bombarded with sensory input. Consider how many objects are in view right now. If you're in a classroom, there are undoubtedly displays on the wall, scenes visible through windows (if you're lucky enough to have windows in your room), and people to look at. Each of those people offers much to see—facial features, hairstyle, items of clothing, jewelry, and so forth. And that's just visual input. What can you hear right now? Is anyone talking? Is there machinery operating? Is there music in your environment? Even a quiet environment might include the rustling of papers or the gentle sound of someone breathing. Add to this the smells, tastes, touches, and internal feedback on balance and position that you receive from your body, and it becomes obvious that we gather more information at any instant than we can possibly cope with or hope to use. **Sensory memory** is the brief, initial encoding of sensory information in the memory system.

We can hold visual information in sensory memory for less than half a second, just long enough to make a decision about its importance. We do this while it is in the *iconic store* (Sperling, 1960). (Think of the little pictures that constitute computer icons to remember that *iconic* is visual.) It is the iconic store that helps us hold one image in our visual field until another image replaces it. We hold auditory, or sound, information in sensory memory for perhaps 3 or 4 seconds, in the *echoic store* (Cowan, 1988; Lu et al., 1992). (Think of the word *echo* to remember that *echoic* is acoustic.) Have you ever been spacing off in class and had a teacher ask, with an irritated tone, "What did I just say?" Did you notice that you can generally retrieve that information, even though you truly weren't paying attention? Thank your echoic store for this ability.

sensory memory Brief, initial coding of sensory information in the memory system.

Short-Term/Working Memory

Your **short-term/working memory** is more permanent than sensory memory. This part of your memory system contains information you are consciously aware of before it is either stored more permanently or forgotten. Short-term memory is referred to as working memory to emphasize the active auditory

short-term/working memory The part of your memory system that contains information you are consciously aware of before it is stored more permanently or forgotten.

processing and visual processing that occur there (Baddeley, 2002). In this way, it is similar to the active memory on your computer that allows you to manipulate and use several applications at once.

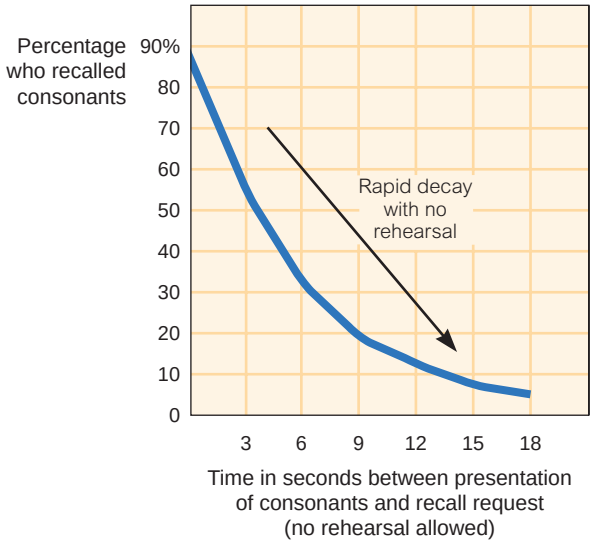
Sensory memory is brief but huge. Short-term memory is far more limited because our consciousness itself is limited—we can attend to only a few things at one time. How many? George Miller (1956) established that short-term memory can maintain roughly seven chunks of information, or—as his classic research article put it in the title—"The Magical Number Seven, Plus or Minus Two." In other words, most people can handle somewhere between five and nine chunks of information at one time. When my co-author spells his name for other people, he can run it all together: E-r-n-s-t. With a five-letter name, people have no problem maintaining the whole thing in their short-term memory at once. When I spell my name for others, however, I can't just run the letters together. *Blair-Broeker* contains 13 characters, including the hyphen, and that is enough to overwhelm short-term memory. I have to pause at least a couple times as I spell it if there is to be any hope of the other person getting it down correctly. Newer research indicates that the magical number may in fact be closer to four items in most cases (Cowan, 2001; Jonides et al., 2008). The point is that we can only work with a relatively small amount of information at any one time. Notice that the capacity of short-term/working memory is a limited number of *chunks*, but you can hold chunks almost as easily as individual items. Holding five words in short-term memory, for example, means that you are likely holding more than five syllables and a lot more than five letters. Chunking is an effective technique not only for encoding but also for increasing the capacity of short-term memory.

What about the duration of short-term memory—how *long* can we retain information in this portion of our memory? About as long as you keep rehearsing it. If you meet a new and interesting person at a party, you will retain the person's name as long as you keep repeating it to yourself. But what if you become distracted? How long will the name stay? To answer this question, researchers (Peterson & Peterson, 1959) presented participants with short, three-consonant groups of letters to remember. They then distracted the participants by giving them an arithmetic task that prevented rehearsal. As the results show (see **Figure 22.8**), short-term memory is indeed short term. Even though people had to remember only three consonants, these items disappeared from memory in less than 20 seconds when rehearsal was prevented.

Short-term memory, with its limited capacity and short duration, is like a stovetop on which you're preparing your dinner. Having only four burners limits the number of dishes and volume of food you can cook. You also must pay active attention to the food you're preparing if you're going to avoid ruining the meal or burning down the house. All the rest of the food stored in your cupboards, refrigerator, and freezer—the food you don't need to pay attention to—represents our next topic: long-term memory.

Figure 22.8
How Long Does Short-Term Memory Last?

As this graph shows, when people are not allowed to rehearse, short-term memory decays rapidly. Within a few seconds, most people are unable to recall three consonants. By the time 20 seconds have passed, nearly everybody has lost their memory of the three consonants. (From Peterson & Peterson, 1959.)



Long-Term Memory

long-term memory The relatively permanent and limitless storehouse of the memory system.

Long-term memory is the relatively permanent and limitless storehouse of the memory system. It can hold memories without conscious effort. Remember the computer analogy here. Short-term memory is like the active memory on your computer that allows you to deal with the various projects that are open on your screen. Constant power (attention) is necessary to maintain short-term memory. What happens to your work if the power blinks off? It's gone! As a result, most of us have learned to save our work frequently. This means we make a copy of the project on the computer's hard drive, a device that will retain the information even when the machine is turned off.

Similarly, we can file information in our long-term memory and have it stay there without paying attention to it. It's available (we hope) when we want it. You probably have not been thinking about these bits of information, but I'll bet you could retrieve with ease your zip code, the name of your English teacher, details of how you spent last New Year's Eve, and countless other facts and events that you encoded and stored at some point in long-term memory. Note that you effectively encoded these pieces of information either because you rehearsed them frequently or because they held personal meaning for you—two of the factors we identified as crucial when we discussed encoding. And now they are permanent residents in your long-term memory storehouse.

There are huge individual differences in the capabilities of long-term memory. Brain damage can destroy a person's ability to store memories for the long term. This was the case with a patient known as H.M. (identified as one Henry Molaison after his 2008 death), whose memory was damaged as an unfortunate side effect of brain surgery. He was able to retrieve long-term memories that were in place at the time of the surgery but could not store memories of any event after it. A researcher who worked with him for over 40 years after his memory was damaged said, "I've known H.M. since 1962, and he still doesn't know who I am" (Adelson, 2005).

On the other end of the scale is the case of a Russian journalist known as S, who could effortlessly recall tiny details of events that had occurred years earlier. For example, he could recall strings of up to 70 digits that he had heard presented just one time. Once learned, he could perfectly recall the numbers even years later—along with details like the clothes worn by the individual who presented the numbers (Luria, 1968). Perhaps even more amazing is the case of Akira Haraguchi, who recited from memory the first 100,000 digits of pi correctly on October 3 and 4, 2006 (Associated Press, 2006). Some people also seem to have remarkable ability to recall their personal history, as you can see in Thinking Like a Psychological Scientist: What Were You Doing on November 4, 2008?

Long-term memory is as expansive as short-term/working memory is limited. What is its duration? Nobody knows for sure, but it's clear that humans can maintain memories for about a century. (Are you willing to trust your computer's hard drive to last that long?) Short-term memory can generally hold four to seven chunks. What's the capacity of long-term memory? Again, nobody knows. Like a sponge with unlimited capacity, your long-term memory can always absorb more, even on days when you feel you can't possibly take in even one more piece of information.

Thinking Like a PSYCHOLOGICAL SCIENTIST

What Were You Doing on November 4, 2008?

What if you couldn't forget? What if every detail of every day of your life was accurately stored in your memory? For example, what if you could accurately recall that Barack Obama was elected president on November 4, 2008, and what the weather was like on that day (and the day before and the day after)? And you could also recall what you were wearing that day, and what you ate for dinner, and a conversation you had with your mom about a neighbor's birthday, and the silly joke your math teacher told during second period, and how much you paid for the shoes you bought in the afternoon? What if, in fact, you could correctly answer any question put to you about anything you experienced that day (or any other day)?

Amazingly, there are such people, and they have recently captured the attention of researchers interested in their *superior autobiographical memory* (Parker et al., 2006). James McGaugh, Larry Cahill, and their colleagues at the University of California at Irvine were intrigued when McGaugh received an out-of-the-blue e-mail from a woman named Jill Price:

> I am thirty-four years old and since I was eleven I have had this unbelievable ability to recall my past, but not just recollections. My first memories are of being a toddler in the crib (circa 1967). . . . [However,] I can take a date, between 1974 and today, and tell you what day it falls on, what I was doing that day. . . . [If] anything of great importance (. . . The *Challenger* Explosion, Tuesday, January 28, 1986) occurred on that day I can describe that to you as well. (Parker et al., 2006, p. 35)

McGaugh and Cahill were skeptical but agreed to meet with Ms. Price. Years of testing convinced them they were dealing with a form of memory that had never been identified before. Even people like the Russian journalist described earlier lacked the comprehensive, day-to-day recall that Ms. Price has repeatedly and reliably demonstrated. She has no special skill at memorizing poems or baseball statistics or the elements of the periodic table, but the details of her life, even the seemingly trivial ones, have remained with her for decades.

And she is not the only one. McGaugh and Cahill have now identified more than a half a dozen people with superior autobiographical memory, including actress Marilu Henner (CBS News, 2010). This form of memory is obviously not common, but we really do not know yet how many people possess it. More importantly, we don't know how the brains of these extraordinary individuals accomplish it.

McGaugh and Cahill are experts in the physiological basis of memory. Now, because of an unexpected e-mail message, they are beginning to explore the hows and whys of a previously unknown phenomenon. We do not know what they will find, but we do know that the path they have started down is a fascinating—and memorable—example of the process of scientific discovery.

Superior Autobiographical Memory

School administrator Jill Price and actress Marilu Henner live very different lives, but they have one remarkable thing in common: Each can remember virtually every detail of every day of her adult life. Studying them and other individuals with this type of super memory may increase our understanding of how memory works.

DAN TUFFS/GETTY IMAGES

AP PHOTO/CHRIS PIZZELLO

One especially interesting kind of long-term memory is **flashbulb memory,** a vivid memory of an emotionally significant moment or event. I have lived long enough to pick up lots of these: driving home in my first car (a used, powder blue 1965 Mustang GT); the sunshine briefly breaking through in the middle of our outdoor wedding; and being left in the hallway as they wheeled my wife in for an emergency cesarean section on the night our son Carl was born. Sometimes flashbulb memories center around a shared event. People in your grandparents' generation may recall with amazing detail what they were doing when they heard the news of the attack on Pearl Harbor. Your parents may have flashbulb memories of President John F. Kennedy's assassination or the explosion of the space shuttle *Challenger.* Vivid memories of the September 11, 2001, terrorist attacks on the World Trade Center will last a lifetime.

R. J. ERWIN/PHOTO RESEARCHERS, INC.

Clark's Nutcracker

Do you ever have trouble remembering where you left your psychology book or your wallet? Compare your memory to that of the Clark's nutcracker. It can remember up to 6000 places where it has stored seeds for the winter (Shettleworth, 1993).

Memory and the Brain

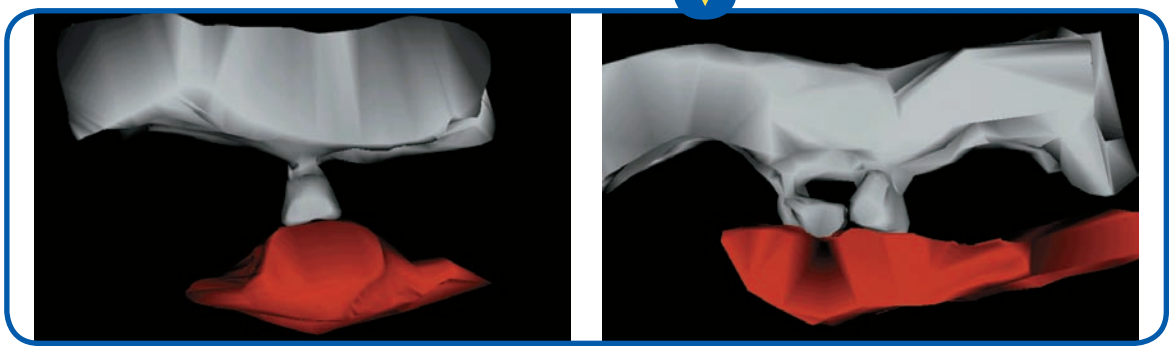
How, exactly, does the brain go about storing long-term memories? This mystery has occupied scientists for decades, but in the last several years, researchers have uncovered some important clues. We now know that our brain does not function like a tape recorder, holding permanent, accurate records of every experience, ready to be played back if the right button is pushed. Current memory research indicates that memories are constructed from myriad bits and pieces of information (Gonsalves et al., 2004; Schooler et al., 1986). Our brain *builds* our memories, just as you would assemble a jigsaw puzzle. When pieces are missing, we invent new ones to fill in the spaces. Because of this, some of our memories are accurate and others are way off.

Another important clue to how memories are stored is that each memory appears to activate a particular, specific pattern of firing in brain cells—neurons. The key to the process lies in the synapses that form the connecting points between the neurons. As the sequence of neurons that represents a particular memory fires repeatedly, the synapses between these neurons become more efficient, a process known as **long-term potentiation** (see **Figure 22.9**). Learning and memory stimulate the

Figure 22.9

Growing a Memory

These two electron microscope images show one way that long-term potentiation makes a synapse more efficient. The left image, before long-term potentiation, shows only one receptor site (gray shows the receiving neuron). The right image shows two receptor sites. This dual target increases the likelihood that a message from the sending neuron will make it across the synapse to the receiving neuron. The growth of the second site is an indication that something may have been learned and remembered.



FROM: N. TONI ET AL., *NATURE,* VOLUME 402, NOVEMBER 25, 1999. COURTESY OF DOMINIQUE MULLER

PUNCHSTOCK

Stress and Memory

Stressful events, such as this car accident, stimulate the release of stress hormones that enhance the formation of memories. These drivers are not likely to forget this day. Such memories may help encourage defensive driving in the future.

neurons to release chemicals (primarily the neurotransmitter serotonin) at the synapses, making it easier for the neurons to fire again in the future (Kandel & Schwartz, 1982; Whitlock et al., 2006). The tracks formed in your brain are almost like a trail blazed through deep snow from a cabin to the woodpile. With each repeated trip, the trail becomes easier to follow.

The concept of long-term potentiation helps explain several other memory phenomena. A variety of things, including a blow to the head, can disrupt neural function and the formation of new memories. This is why football players who have suffered concussions may have trouble remembering the play during which the injury occurred (Yarnell & Lynch, 1970). Drugs can also enhance or disrupt memories by interacting with the neurotransmitters necessary for long-term potentiation. Alcohol is one such drug, which accounts for the alcohol-induced memory "blackout" that often accompanies a night of heavy drinking (Weingartner et al., 1983).

Stress hormones also affect memory. Do you think they disrupt or enhance the ability to form long-term memories? Here's a hint: Stress is often the body's response to danger. It is important that we retain details of dangerous situations so that we can protect ourselves in the future. It's not surprising, then, that stress enhances memories. The hormones tell your body that something significant is happening, and they trigger biological changes that stimulate the formation of memories. People given a drug to block the effect of hormones in a stressful situation tend to remember fewer details of an upsetting story than their counterparts who did not receive the drug (Cahill, 1994). The part of the brain that processes stress-induced emotion activates the region responsible for forming memories and enhances its ability to function (Buchanan, 2007; Kensinger, 2007).

Explicit and Implicit Memories

Let's examine one last aspect of long-term memory. There are many types of memories, but one major division separates explicit memory from implicit memory (see **Figure 22.10**). **Explicit memory** is what we normally think of when we think of memory: the recall of facts and experiences. At what temperature does water freeze? Where did you eat dinner last night? What is your mother's middle name? Answering all these questions requires a conscious effort to retrieve and state information. **Implicit memory** is the recall of skills and procedures, like walking. It requires no such conscious effort. You don't have to think about how to ride a bicycle before pedaling off. Nor do you have to think about how to read or how to button your shirt. Your ability to perform all these tasks depends on memory, but it is implicit, not explicit.

Explicit memory and implicit memory appear to be entirely different systems, controlled by different brain parts. Explicit memories are processed through the *hippocampus,* a small structure located in the central region of the brain. Implicit memories are processed through the *cerebellum,* the rounded

flashbulb memory A vivid, clear memory of an emotionally significant moment or event.

long-term potentiation An increase in a synapse's firing efficiency that occurs when the sequence of neurons that represents a particular memory fires repeatedly; believed to be the neural basis of learning and memory.

explicit memory The memory of facts and experiences.

implicit memory The memory of skills and procedures.

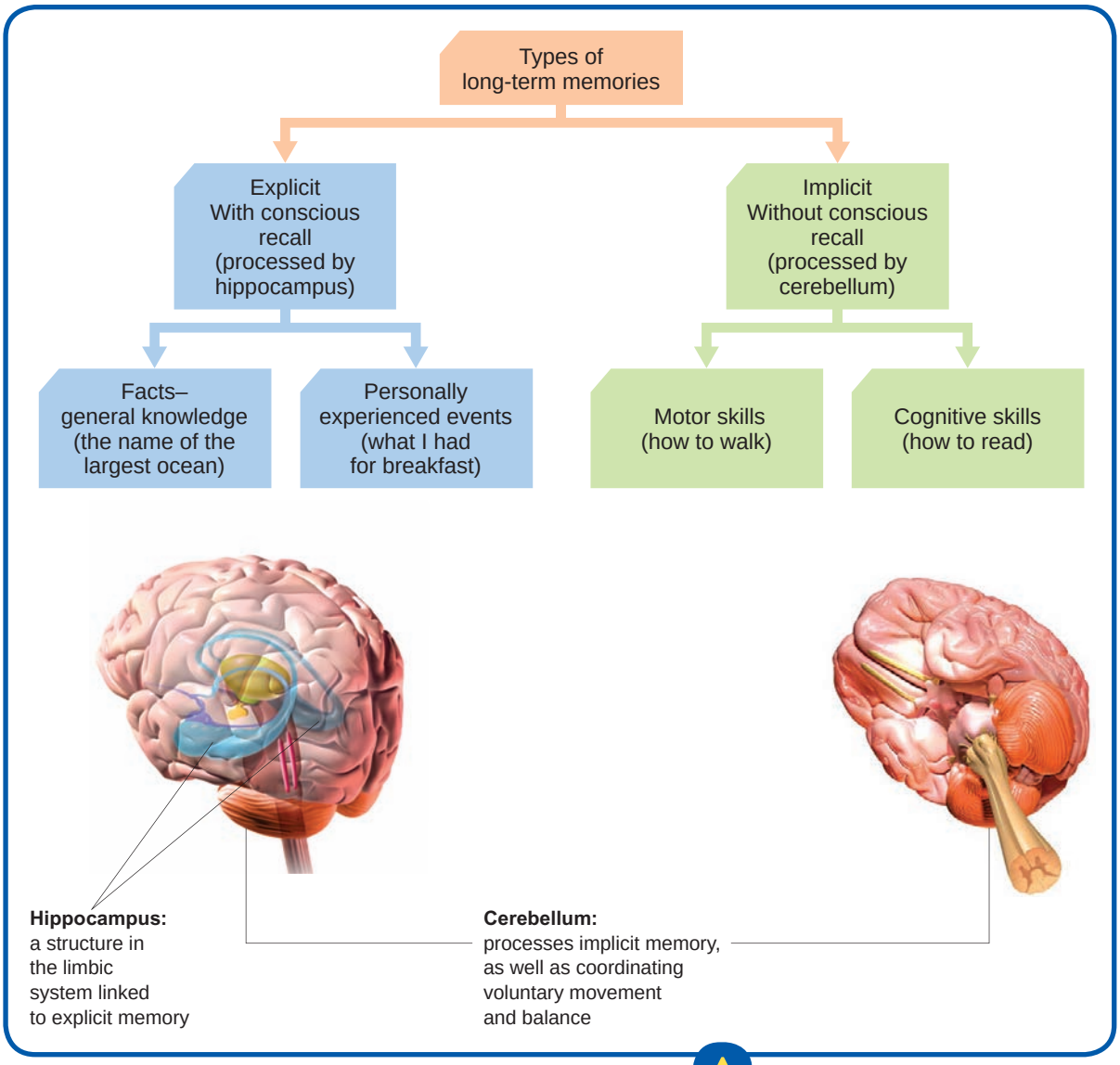

Types of long-term memories
Explicit With conscious recall (processed by hippocampus)
Implicit Without conscious recall (processed by cerebellum)
Facts– general knowledge (the name of the largest ocean)
Personally experienced events (what I had for breakfast)
Motor skills (how to walk)
Cognitive skills (how to read)
Hippocampus: a structure in the limbic system linked to explicit memory
Cerebellum: processes implicit memory, as well as coordinating voluntary movement and balance

Figure 22.10
Explicitly or Implicitly Remembered?

Long-term memories can be classified as either explicit or implicit. These two types of memories are processed by different parts of the brain. Explicit memories of facts and experiences are processed through the hippocampus, a part of the limbic system deep in the center of the brain. Implicit memories for procedures and skills, however, are processed by the cerebellum, a structure at the bottom rear of the brain.

structure at the bottom rear of the brain (see Figure 22.10). Odd things can happen because of this split. A man who experienced damage to the hippocampus, for example, would be unable to form new explicit memories, but his ability to form implicit memories would remain intact. What would happen if he went to play golf on the same course each day? He would have no explicit memory of the course—it would seem like a new place every time. But his scores would gradually improve over time, because his implicit memories would allow him to get better at golf as he continued to practice.

PAUSE NOW OR MOVE ON

Turn to page 409 to review and apply what you've learned.

recall The type of retrieval in which you must search for information that you previously stored, as on a fill-in-the-blank test.

recognition The type of retrieval in which you must identify items you learned earlier, as on a multiple-choice test.

Retrieval

WHAT'S THE POINT?

22-3 What factors influence what we can remember and what we forget?

The final step in the updated information-processing model of memory is retrieval, the process of getting information out of memory storage. Two forms of retrieval are recall and recognition:

- **Recall** is the type of retrieval we usually think of as "memory"—searching for information that was previously stored. In recall, we are calling a memory back into conscious awareness. This is the literal meaning of the word *re-call*. Test makers use fill-in-the-blank, short-answer, and essay questions to tap recall.
- **Recognition** is a type of retrieval in which you must identify items you previously learned. Recognition is an easier process than recall because you only need to identify information. You may struggle to describe an individual you witnessed committing a crime (recall) yet have little trouble picking the person out of a police lineup (recognition). Multiple-choice and matching questions test recognition.

How do we get to the memories we need to retrieve? We follow pathways, often multiple pathways, that lead to the memory. When I need to contact a friend, I can do so by hopping in the car and driving to her house. If I'm less rushed, I can walk over. I can also text her, call her on the phone, find her on Facebook, or send a message via a mutual friend who I know will see her before I do. The point is, I have lots of ways to reach her. Likewise, there are many pathways I can follow to retrieve a memory. I can "connect" to a memory of, say, Mount Rushmore by remembering a family trip, by thinking of a TV show I might have seen, or by seeing a photo in a magazine. In each case, my memory of Mount Rushmore is primed, or triggered, by a memory retrieval cue (see **Figure 22.11**).

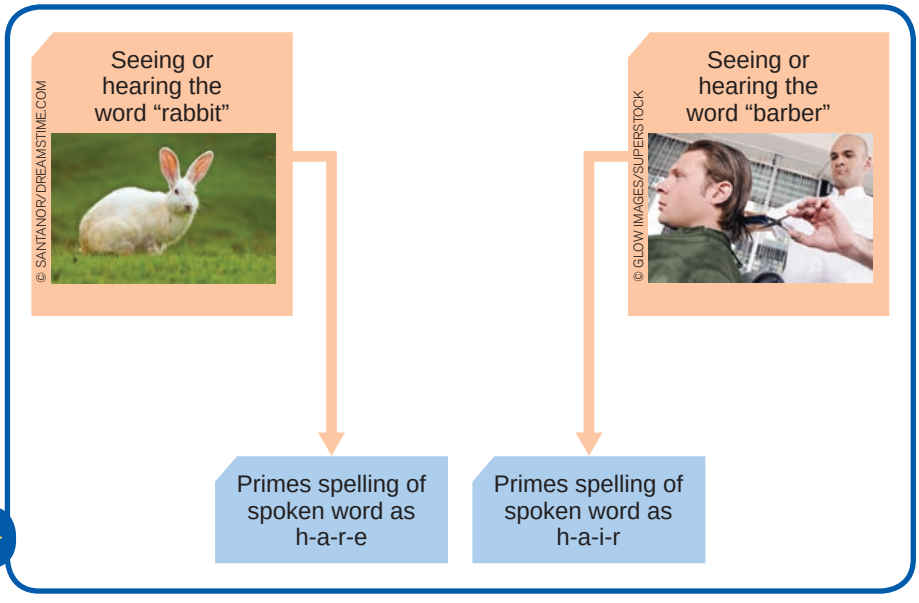
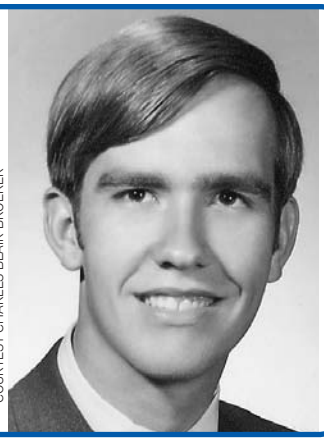

Seeing or hearing the word "rabbit"
© SANTANOR/DREAMSTIME.COM
Seeing or hearing the word "barber"
© GLOW IMAGES/SUPERSTOCK
Primes spelling of spoken word as h-a-r-e
Primes spelling of spoken word as h-a-i-r

Figure 22.11
A Hare-Raising Experience

If you show people a picture, you can activate certain associations in their memory pathways—a process known as priming. When you later ask them to spell a word that can be spelled in two ways (*hare* or *hair*), their response may reflect the content of the picture. Thus, a picture of a rabbit is likely to activate the spelling h-a-r-e. A picture of a barber at work is likely to activate the spelling h-a-i-r. (Adapted from Bower, 1986.)



High School Days

Here is how my co-author and I looked when we were your age. Our present students might have difficulty identifying us, but our high school classmates would probably have no trouble.

Memories weave a web of neural pathways inside the brain, and retrieval cues send us down one pathway or another in our search for memories. Have you ever noticed that the more you know about a subject, the easier it is to learn even more about it? Learning and retrieval build on each other. If you know only one or two isolated facts about how the federal government works, you don't have much of a framework upon which to hang new information. But if you already know about the Constitution, the three branches, the role of the civil service, significant Supreme Court decisions, and close presidential elections, it becomes relatively easy to integrate new information. This interrelated web of association allows for easy priming of memory and thus more effective retrieval.

Now that you know what the two types of retrieval are, let's turn to two factors that influence our ability to retrieve: context and state dependency.

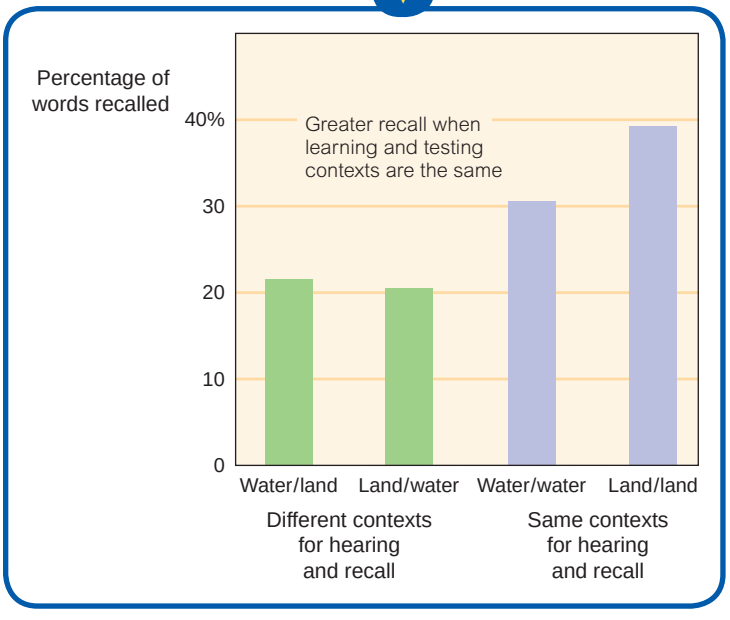
context effect The enhanced ability to retrieve information when you are in an environment similar to the one in which you encoded the information.

Context

Context is the environment in which you encode or retrieve information. When you are in an environment similar to the one in which you encoded the information, you may experience the **context effect**—an enhanced ability to retrieve information more effectively. This happened when my wife and I visited a little town in Oregon where her family vacationed many years before. When we arrived, her memories began flooding back, and she was able to direct me to several landmarks around town. Returning to the context where she had encoded the memories primed the retrieval of those memories years later. One experiment carried this idea even further. The researchers divided scuba divers into groups and read each group a list of words. One group heard the list onshore; the other group heard the list underwater (see **Figure 22.12**). Later, those who heard the words onshore recalled more of the words when they were onshore, and those who heard the list

Figure 22.12
Context and Memory

As this rather odd experiment demonstrated, retrieval is best when it occurs in the same environment where encoding took place. In this case, the context was either under 10 feet of water (while scuba diving) or sitting on the shore. (Adapted from Godden & Baddeley, 1975.)



state-dependent memory
The enhanced ability to retrieve information when you are in the same physical and emotional state you were in when you encoded the information.

underwater recalled the words better underwater (Godden & Baddeley, 1975). Any environment provides countless cues that can later function to prime the retrieval of memories.

State Dependency

Our ability to retrieve memories also depends on the physical or emotional state we were in at the time we encoded an event. **State-dependent memory** is the enhanced ability to retrieve information when you are in the same physical and emotional state as you were when you encoded the information. Strangely, if you were tired when encoding, retrieval will also be better when you are tired. Note, however, that you will neither encode nor retrieve as well when you are tired as you would if you were not tired. Do you drink caffeinated drinks, like cola, when you study? Chances are you retrieve better under the influence of caffeine. This even extends to drugs that normally disrupt learning, like alcohol (Lowe, 1987). Despite its overall negative effects, if you were under the influence of alcohol when encoding, you would retrieve somewhat better (although not well!) with alcohol in your system.

The retrieval of memories also depends on your mood. If you're happy when you encode, you'll retrieve better when you're happy. But if you've been somewhat depressed as you worked your way through a particular unit in a class, you'll probably test better when depressed. Odd, isn't it? Perhaps even more significant is the way our moods bias our memories. If you're in a good mood when you think back to first grade, the mood is likely to prime positive first-grade memories. But if you're depressed when you try to remember, your mood is likely to function as a retrieval cue for negative memories (Eich, 1995).

PAUSE NOW OR MOVE ON

Turn to page 409 to review and apply what you've learned.

Lose your memories, and you've lost your sense of self. Without the past, both joy and sadness would be fleeting and our world would be shallow indeed. We would have no way to connect events, and we would be unable to learn anything. Our waking hours are a constant progression of encoding important information into memory, storing countless pieces of information on both a short-term and a long-term basis, and retrieving needed information from long-term storage. If you remember nothing else about this topic, remember the remarkable, amazing role memory plays in our daily lives.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 22

Thinking About Information Processing

Encoding

WHAT'S THE POINT?

22-1 What are the factors that allow us to effectively encode information into our memory system?

- Automatic processing is the unconscious process of encoding certain information without effort. Effortful processing is encoding that requires attention and conscious effort.
- The serial position effect is the tendency to recall the first and last items on a list more easily. Distributed rehearsal works better than massed rehearsal.
- Semantic encoding is the process of making material meaningful. Visual images are often automatically encoded and remembered well. Mnemonic devices are memory tricks like the method of loci and the peg-word system. Chunking and organizing information into a hierarchy are effective encoding techniques.

Apply What You Know

1. The _____ effect enhances encoding by making information personally relevant.
2. True or False: Frequent short study sessions are more effective than a few lengthy study sessions.

Storage

WHAT'S THE POINT?

22-2 What distinguishes sensory, short-term/working, and long-term memories?

- Sensory memory is the brief, initial encoding of iconic (visual) and echoic (sound) information in the memory system. Short-term/working memory contains information you are consciously aware of before it is stored more permanently or forgotten. Long-term memory is the relatively permanent and limitless storehouse of the memory system. Memories are stored in the brain through long-term potentiation.
- Stress hormones tell your body that something significant is happening, triggering biological changes that enhance memories. Explicit memories—recall of facts and experiences—are processed through the hippocampus. Implicit memories—recall of skills and procedures—are processed through the cerebellum.

Apply What You Know

3. What memory storage system holds the information you are thinking about right now?
   a. short-term/working memory
   b. sensory memory
   c. long-term memory
   d. flashbulb memory
4. An increase in a synapse's firing efficiency that seems to represent how the brain forms memories is called _____.

Retrieval

WHAT'S THE POINT?

22-3 What factors influence what we can remember and what we forget?

- Identifying whether something matches information in our long-term memory (recognition) is easier than recalling information.
- The other major factor that influences what we remember is context: It is easier to remember information if we are in an environment similar to the environment the information was encoded in (context effect) or if we are in the same emotional and physical state we were in when we encoded the information (state-dependent memory).

Apply What You Know

5. How can context and state contribute to the retrieval of memories?

6. True or False: A multiple-choice test is based on recall retrieval.

KEY TERMS AND KEY PEOPLE

encoding, p. 390
storage, p. 390
retrieval, p. 390
automatic processing, p. 391
effortful processing, p. 391
rehearsal, p. 392
serial position effect, p. 393
semantic encoding, p. 394
mnemonic [nih-MON-ik] device, p. 396
chunking, p. 397
sensory memory, p. 399
short-term/working memory, p. 399
long-term memory, p. 401
flashbulb memory, p. 403
long-term potentiation, p. 403
explicit memory, p. 404
implicit memory, p. 404
recall, p. 406
recognition, p. 406
context effect, p. 407
state-dependent memory, p. 408
Hermann Ebbinghaus (1850–1909), p. 392

MODULE 23

Forgetting and Memory Construction

Forgetting as Encoding Failure

Forgetting as Storage Failure

Forgetting as Retrieval Failure

- Interference
- Motivated Forgetting

Memory Construction

- Children's Recall
- Recovered Memories

Um, OK, where are my keys? And I can't finish this project without my calculator. Have you seen my coffee cup? Sure, I'll contribute a dollar to the food drive . . . if I can find my billfold, that is. Aw, forget it. Let's just move on to the new module.

"I forgot." When was the last time you used this simple, two-word phrase? Did it relate to a forgotten assignment? A chore you should have done? A friend's birthday? We all suffer from memory lapses fairly regularly. In this module, we'll see what psychology has learned about forgetting.

We process information into our memory through three stages: **encoding** (getting information into memory), **storage** (retaining that information), and **retrieval** (getting the information back out after it's been stored). When we say, "I forgot," we could be describing a failure at any of these three stages: lack of encoding *or* ineffective storage *or* inability to retrieve what has been adequately stored. Forgetting is complicated!

encoding The process of getting information into the memory system.

storage The retention of encoded information in memory over time.

retrieval The process of getting information out of memory storage.

Forgetting as Encoding Failure

WHAT'S THE POINT?

23-1 How does encoding failure lead to forgetting?

The cafeteria in my school is in the basement. Its roof is held up by a series of pillars. By the time students reach my class as juniors and seniors, they have been in that room hundreds of times, both for lunch and for study halls. When I quiz them on the number of pillars in the cafeteria, however, fewer than half of them can correctly recall that there are 11 of them. Students guess as few as 2 or as many as 20. How can it be that these bright young people do so poorly remembering something they have seen so often? Despite numerous exposures to the 11 pillars, few students encode this information into memory because it is relatively unimportant to them. As long as there are enough pillars to hold up the roof (an issue of trust for almost everyone), they don't care how many there are.

We all fail to encode information in our environment, as you can see if you try this simple quiz. On the back of a U.S. penny, you will find the value listed as "one cent."

- What is the similar value statement on the back of a dime? How about on a quarter?
- Which way does Lincoln face on the penny—to his left or to his right? (After you answer this question, try your luck at identifying the real penny in **Figure 23.1.**)
- Which way does Jefferson face on the nickel?
- Finally, which way does Washington face on the quarter?

Think of how many hundreds of times you have seen and used these coins. Yet unless you have an interest in coin collecting, you may not be able to answer any of these questions. (You can find the answers when you turn the

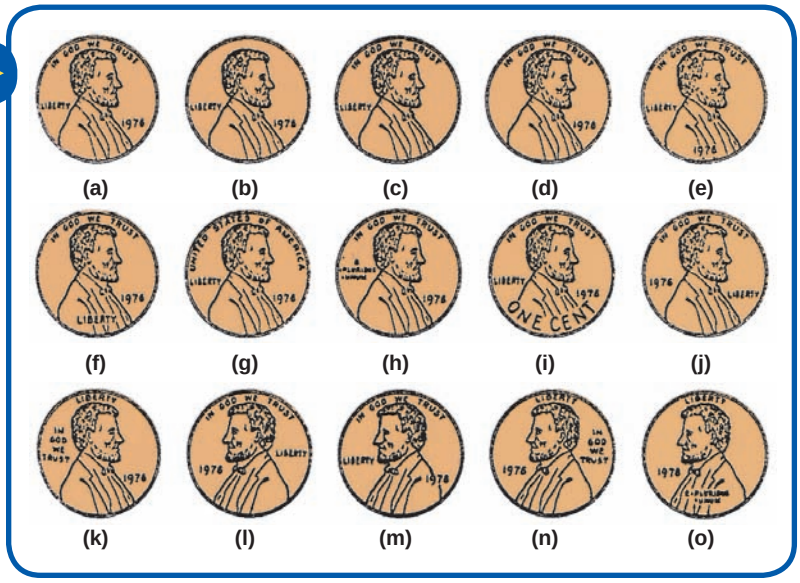


Figure 23.1
How Can You Remember What You Haven't Encoded?

Can you pick out the real deal? (Turn the page for the answer.) Most of us can't because we've never bothered to encode this information. The penny spends just as well whether we can identify the correct version or not. (From Nickerson & Adams, 1979.)

page.) You probably haven't *forgotten* the answers. Rather, you never bothered to encode this information because you don't need to know these details to be able to spend the coins.

Encoding failure may contribute to the increasing "forgetfulness" some older people experience. As we age, the parts of the brain active during encoding respond more slowly (Grady et al., 1995). Older people may forget where they left their eyeglasses or what time to take their medication because they did not succeed in encoding the information.

PAUSE NOW OR MOVE ON

Turn to page 423 to review and apply what you've learned.

Forgetting as Storage Failure

WHAT'S THE POINT?

23-2 How does storage failure lead to forgetting?

I've long been fascinated by the compost pile that we keep behind our house. A never-ending stream of grass clippings, leaves, weeds, eggshells, grapefruit rinds, celery stalks, and other organic rubbish makes its way into the pile, only to rapidly decompose to a small fraction of its original bulk. Are memories like that, decaying like the material in the compost pile?

This idea of decay is consistent with the results obtained by **Hermann Ebbinghaus** (1885), famous for his pioneering studies of memory. His "forgetting curve" (see **Figure 23.2**) indicates that most forgetting happens rapidly and then levels off. Most memory loss occurs in the first few days (just as the most decomposition occurs early in the compost pile) and then slows

HERMANN EBBINGHAUS (1850–1909) German philosopher who conducted pioneering memory studies.

BETTMANN/CORBIS

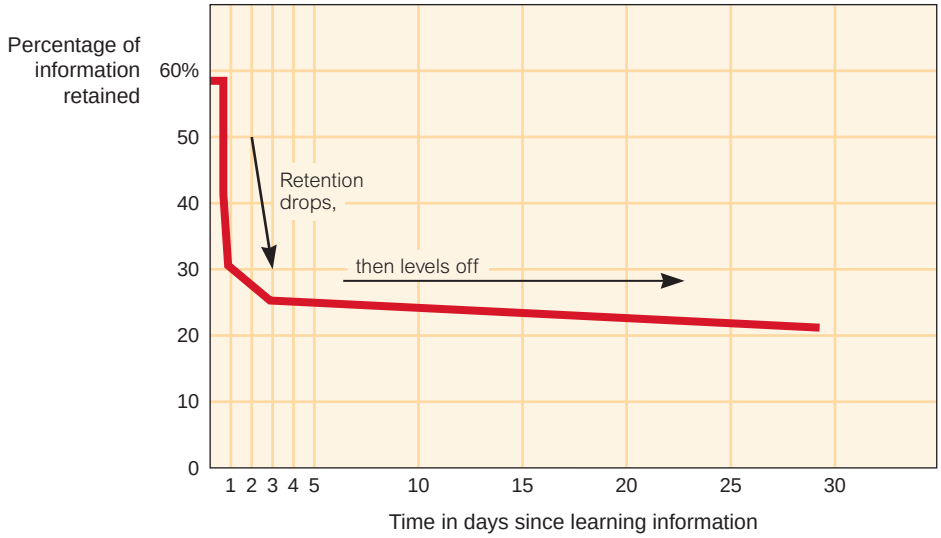


Figure 23.2
The Forgetting Curve

Hermann Ebbinghaus demonstrated more than a century ago that most forgetting occurs soon after learning. After a steep initial drop, we retain most of the remaining information. (Adapted from Ebbinghaus, 1885.)

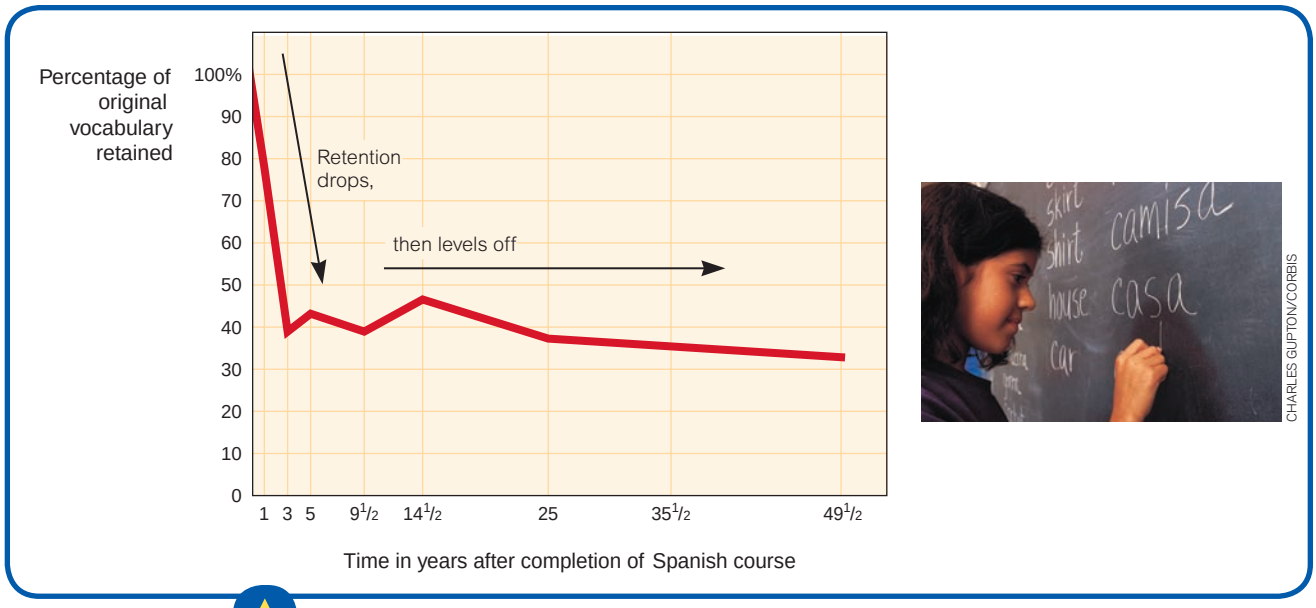


Figure 23.3
Permastore Memory

This graph shows how well people retained Spanish vocabulary they had learned in school a half-century earlier. Note that although the timeline differs, this forgetting curve has the same shape as the one in Figure 23.2, which Ebbinghaus identified. (Adapted from Bahrick, 1984.)

considerably. More recent research has looked at the process of forgetting far beyond the 30 days Ebbinghaus examined (Bahrick, 1984) (see **Figure 23.3**). The researcher was interested in how well people remembered the vocabulary they had learned in Spanish class decades earlier. He found that most vocabulary was lost in three years, but that after that initial loss the forgetting curve leveled off. Words people remembered after three years were likely to remain in their memories a half-century later. The term **permastore memory** is used to describe these long-term memories that are especially resistant to forgetting and are likely to last a lifetime.

We still don't know enough about how long-term memories are stored in the brain to understand whether they actually decay with time. The work on permastore memory seems to indicate that some memories do not decay. It will be interesting to see whether future research demonstrates a change in the physical storage of the memories that decay. What we do know for sure is that we sometimes forget because we are unable to retrieve memories that are still stored.

PAUSE NOW OR MOVE ON

Turn to page 424 to review and apply what you've learned.

● Answer to the penny exercise in Figure 23.1: Penny (a) is the real penny.

● Answers to the questions in the list about coins on page 412: A dime reads "one dime," a quarter reads "quarter dollar," Lincoln faces to his left, and both Jefferson and Washington face to their right.

Forgetting as Retrieval Failure

WHAT'S THE POINT?

23-3 How does retrieval failure lead to forgetting?

Retrieval failure probably accounts for most of our forgetting. You've encoded and stored the information. It's in there, but you can't get it out. Sometimes this is true because the memory you're after is being disrupted by

interference. Other times you may have a reason to not remember, creating *motivated forgetting*.

permastore memory Long-term memories that are especially resistant to forgetting and that are likely to last a lifetime.

proactive interference When an older memory disrupts the recall of a newer memory.

retroactive interference When a more recent memory disrupts the recall of an older memory.

Interference

Interference is a retrieval problem that occurs when one memory gets in the way of another. Have you ever traveled in a car from one city to another, happily listening to music on your favorite radio station? As you approach the new city, you may find that the music begins to turn into some other kind of music you'd never listen to. The two types of music will compete for your attention because two stations with similar radio frequencies are sharing the airwaves. If neither is strong enough to dominate, interference occurs and you won't be able to receive either station clearly.

A similar thing happens with memories. When an older memory disrupts the recall of a newer memory, you experience **proactive interference** (see **Figure 23.4**). Have you ever had to learn a new phone number? When you get the new number, you sit down and rehearse it until you commit it to memory. Later on, however, when somebody asks you for your new number, you may be unable to retrieve it by memory alone. When you follow the retrieval pathway in your brain to "my phone number," the only number you can find is the old one. Your earlier learning is interfering with your retrieval of the more recent information—your new number. Here are some other examples of proactive interference:

- Remembering last year's locker combination proactively interferes with remembering this year's combination.
- Calling your current girlfriend's house on the phone and asking to speak to your *former* girlfriend. (This actually happened to me when I was in high school—not a pleasant experience!)
- Remembering the word for something in the first foreign language you studied, but not being able to recall the word for that item in the most recent foreign language you studied.

You can also suffer from **retroactive interference,** which occurs when a more recent memory disrupts the recall of an older memory. I have had the

Figure 23.4
Scenes of Interference

(a) Tyrone is having trouble remembering his new combination because it is being interfered with by his memory of last year's locker combination. (b) Mary is having trouble remembering her junior year homecoming dance because it is being interfered with by the less recent sophomore year dance.

DIGITAL VISION/GETTY IMAGES

Interference

Have you ever had trouble figuring out which remote was for which device? Have you ever struggled to find an on-off button or a volume control because these functions are in different places on different remotes? Life would be simpler if we only had one remote or at least one layout for the buttons. Interference—both proactive and retroactive—causes us to struggle as we switch from one to another.

same landline phone number now for more than 20 years. I have rehearsed it so well that I find it impossible to retrieve my earlier phone numbers. When I was in college, I easily retrieved my dorm phone number, but I no longer have any idea what it was. My current phone number retroactively interferes with it. There are lots of examples of this phenomenon, too:

- Your memory of your class schedule for this year has overwhelmed the schedule you followed last year.
- Your memory of current sports champions (World Series, Super Bowl, NCAA basketball, and so forth) will probably displace memories of champions from previous years.
- You can remember the sequence of buttons necessary to activate your current electronic devices (cell phone, DVD player, and so on), but you probably can't remember how to operate the ones you had five years ago.

Interference isn't the only thing that interferes with the retrieval of memories. Sometimes we are motivated to not retrieve.

Motivated Forgetting

Sometimes, you have a reason to forget. The act of forgetting can provide protection from anxiety or from potentially distressing information. If you're trying to exercise more, those two days you were a couch potato last week might just slip your mind. If you're trying to cut calories, that candy bar your friend shared with you between classes may not make it into your daily calorie count. To remember these things would be to admit that you hadn't quite lived up to your goals. That's motivation to forget them.

Does scientific evidence support the idea of motivated forgetting? *Yes.* In one experiment, students took a study skills course in which they were asked to recall their previous study habits. They remembered studying less than they actually had, which allowed them to think the study skills course was more effective (Conway & Ross, 1984).

Repression

Sigmund Freud argued and some psychotherapists still believe that we block from consciousness—or repress—memories that could cause us anxiety. Research evidence is mixed on this issue, making the concept of repression controversial.

BILL ARON/PHOTO EDIT

There is less scientific support for **Sigmund Freud's** famous attempt to understand motivated forgetting through **repression,** the process of moving anxiety-producing memories to the unconscious mind. This, he thought, may be how we protect ourselves from painful memories, although the memories continue to lurk beneath the level of consciousness and can haunt us in a variety of ways. One goal of therapy, Freud thought, is to bring these buried memories to the surface so that they can be fully understood.

repression In Sigmund Freud's psychoanalytic theory, the process of moving anxiety-producing memories to the unconscious mind.

Many of Freud's ideas about the unconscious mind have worked their way into popular culture. Movies and novels often illustrate how repression is supposed to work. Despite the reality that there is little experimental evidence to support this theory, 90 percent of college students still believe that the process of repression protects people by pushing painful memories to the unconscious (Kihlstrom, 1990). Actually, stressful incidents tend to stimulate the release of stress hormones that *enhance* the encoding and storage of memories (Cahill, 1994). So, although we seem readily able to forget minor details when motivated, we are, unfortunately, more—not less—likely to remember painful events (Payne & Corrigan, 2007).

KEYSTONE PICTURES USA/ALAMY

SIGMUND FREUD (1856–1939) Founder of psychoanalysis, a controversial theory about the workings of the unconscious mind.

PAUSE NOW OR MOVE ON

Turn to page 424 to review and apply what you've learned.

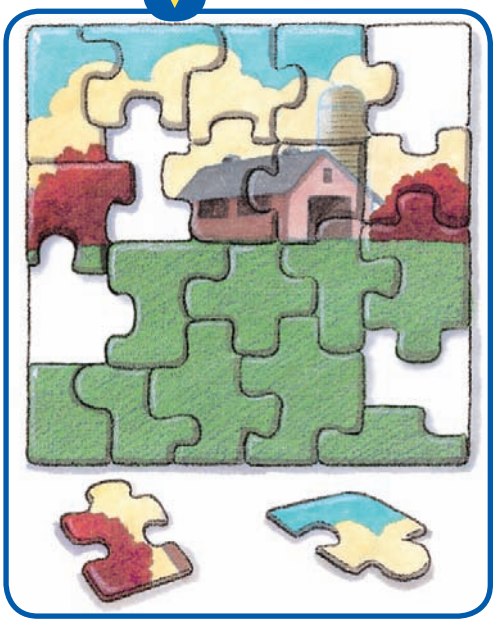
Memory Construction

WHAT'S THE POINT?

23-4 How does memory construction contribute to inaccurate memories?

Figure 23.5
How Does Memory Work?

Memory is less like a DVD or a computer hard drive than like a jigsaw puzzle with missing pieces. Your brain "manufactures" new pieces to fill the holes and construct a complete memory.



Many people believe that memories are like DVDs. As long as you can find the right disc to replay, you can access the recorded memory. Not so. Retrieving a memory is more like building a jigsaw puzzle (see **Figure 23.5**). That's because of the way we store memories. When you commit an event to memory, your brain stores the memory in tiny pieces. Some pieces are invariably lost, so when you try to reassemble the puzzle, there are holes. Like a creative carpenter, your brain builds new pieces to fill those gaps. The new pieces may or may not represent what was there originally, but once they take their place in the assembled puzzle, you have no way of determining whether they are real or fictional.

Shall we try it? You will need a piece of paper and a pencil. When you're all set, give yourself 30 seconds to commit to memory as many of the following words and phrases as possible. Don't continue reading until you've spent your 30 seconds memorizing:

textbook, all-nighter, quiz, flashcards, review, lecture, vocabulary, GPA, outline, essay, notes, semester, exam, due date, grading scale, assignment, unit test, memorize, class project, handouts, tutor, chapter guide

Now, in whatever order you can, and without referring to the original list, see how many of the words you can write on your paper. Take as long as you like. Then go back and check your list against the original. Chances are you will have remembered quite a few of the items. You are also likely to have left off some items—that was a lot to learn in 30 seconds. Now, without looking at the list, answer these four questions:

1. Was the word *lecture* on the list?
2. Was the word *grading scale* on the list?
3. Was the word *study* on the list?
4. Was the word *school* on the list?

Study and *school* were not on the original list, but people often "remember" them anyway.

If you said *study* and *school* were on the original list, you might be thinking that we fooled you. After all, these two words seem to belong on this list. That's just the point. As you struggled with the difficult memory task and the follow-up questions, you began to speculate on items that reasonably belonged on the list. Now you have a problem—which items were really there at first, and which were imagined? Your memory was constructed out of some things that were real and some that were not, and distinguishing between the two categories will now be difficult.

DON SHRUBSHELL

ELIZABETH LOFTUS (1944–) Psychologist at University of California, Irvine, whose research established the constructed nature of memory.

Psychologist **Elizabeth Loftus** of the University of California, Irvine, was the first to demonstrate in the laboratory this tendency to construct memories. She and her colleague John Palmer (1974) showed participants a film of a car accident (see **Figure 23.6**). They varied the wording in their questions, asking one group, "About how fast were the cars going when they *smashed* into each other?" and the other, "About how fast were the cars going when they *hit* each other?" This seemingly minor difference was enough to produce significantly greater speed estimates by the "smashed" group. The researchers were able to alter memory simply by the way they phrased the question, and the participants were never aware of the manipulation.

Loftus and Palmer demonstrated another important aspect of memory a week later, when they asked participants whether they recalled seeing

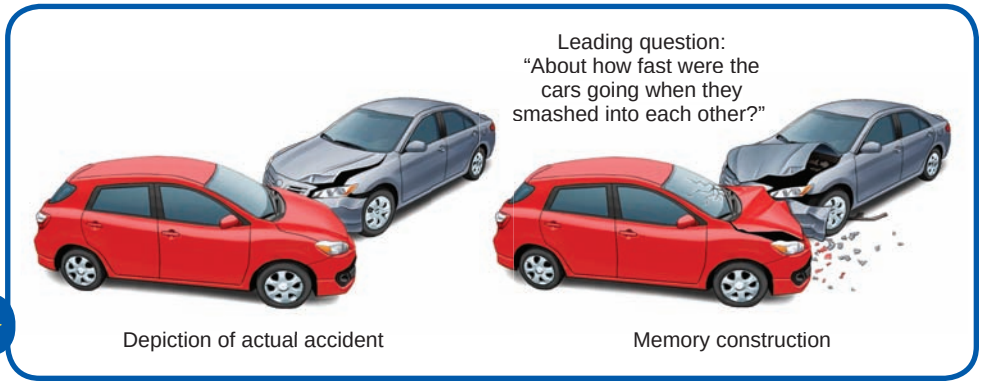

Leading question:
"About how fast were the cars going when they smashed into each other?"
Depiction of actual accident
Memory construction

Figure 23.6
The Nature of Memory

What we remember depends partly on the wording of the questions we are asked. People who were asked questions about cars "smashing" remembered a worse collision than those who were asked questions about cars "hitting" each other. (From Loftus, 1979.)

broken glass at the scene of the accident. The "smashed" group was more than twice as likely as the "hit" group to recall broken glass. There was no broken glass. The question led participants to construct memories of broken glass because this is a reasonable outcome of an accident, especially one in which the cars had "smashed" into each other. Incorporating misleading information into a memory, as occurred here, is known as the **misinformation effect.**

misinformation effect Incorporating misleading information into a memory of an event.

Hundreds of experiments have verified the tendency to construct memories. Misinformation can cause a hammer to be recalled as a screwdriver and breakfast cereal to be recalled as eggs, among a myriad of similar transformations (Loftus et al., 1992). And the more time that passes before the misleading information is provided, the greater the misinformation effect will be (Loftus, 1992). Even asking students to imagine that something happened, like breaking a window with their hand, led a quarter of the questioned students to later recall the event as real (Mazzoni & Memon, 2003). This may be because imagining an event activates the same parts of the brain that would be activated by the event itself (Gonsalves et al., 2004).

Think for a minute about how important this finding is. If memory can be altered by the way questions are asked, this has major implications for courtroom testimony. A skillful attorney can actually change a witness's memory by carefully wording the questions, and the witness will probably be unaware of the manipulation. When you realize that eyewitness testimony is one of the most damning kinds of evidence in a criminal trial, you can see that everyone involved—particularly the jury—should be aware of the basic processes that control memory and forgetting. Inaccurately constructed memories help us understand why 200 convicts in one study were later found innocent by DNA testing. Seventy-nine percent of them had been convicted partially because of inaccurate eyewitness identification (Garrett, 2008). Psychology becomes especially relevant when it can help prevent the miscarriage of justice.

The media spotlight has been shining on two related areas of interest in recent years: children's testimony in alleged cases of child abuse and recovered memories of abuse. Let's look at what researchers have learned about these two important topics.

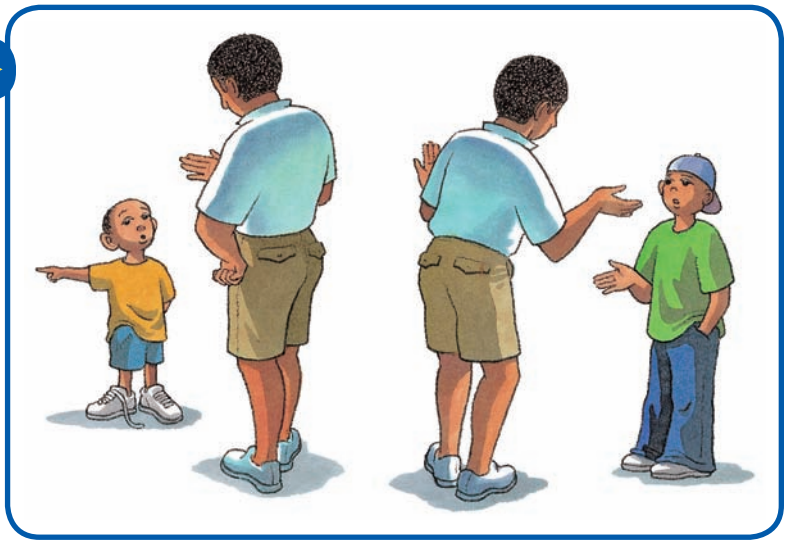
Children's Recall

Child abuse occurs with alarming regularity, and people who abuse children must be identified and prosecuted as the criminals they are. Yet as important as it is to punish abusers, we must also protect innocent adults from being falsely accused of crimes they did not commit—a situation that also happens regularly. When people are charged with child abuse, their innocence or guilt may be determined by the testimony of young children. Is such testimony reliable? Are children's memories accurate? Let's look at some evidence.

Researchers who have set out to intentionally alter children's memories have been remarkably successful, especially in demonstrating the misinformation effect. Two of the leading researchers in this area (Ceci & Bruck, 1993)

Figure 23.7
The Accuracy of Children's Recall

This adult is likely to obtain less accurate information from the child on the left because that child is younger. Older children recall events more accurately than younger children do. Children's memories are also more accurate if the adult uses words the child can understand and refrains from using leading or suggestive questions.



were able to plant false memories in preschoolers by interviewing them once a week for 10 weeks and repeatedly asking questions like "Can you remember going to the hospital with a mousetrap on your finger?" Eventually, a large number of the children constructed stories that ended with mousetraps and hospital visits. The stories were false but convincing, and they were almost impossible to distinguish from true memories. Children can develop false memories even without repetition of the misinformation. When preschoolers overheard a false remark that a magician's rabbit had escaped, over three-fourths of them actually remembered having seen the rabbit when later asked (Principe et al., 2006).

Researchers have established two general principles about children's memory (see **Figure 23.7**). First, children's memories grow more accurate with age. Compared with older children and adults, preschool-age children are more susceptible to suggestion—and therefore less accurate—90 percent of the time (Bruck & Ceci, 1999). For example, studies report that younger children are more likely than older children to falsely report that someone had licked their knee or that something "yucky" had been put in their mouth.

The second and more important principle is that there are ways to minimize these false memories in children. The key is to eliminate the suggestibility and misinformation that can lead children, in their effort to please the adults asking questions, to construct false memories. One surprising example of suggestibility involved the anatomically correct dolls (dolls with realistic sexual details) that investigators often use when asking children about possible abuse. The problem is that these unusual dolls, *in and of themselves,* may suggest to children that they should talk about genital contact. In one study, researchers asked 3-year-olds to use anatomically correct dolls to illustrate how they had been touched during a doctor's examination. Although none of these children had been touched in their genital area, more than half of them reported such contact, apparently because these details on the dolls suggested to the children that such a response was desired (Ceci & Bruck, 1993).

Knowing that young children are prone to constructing false memories, investigators should develop techniques to minimize the misinformation

effect. Studies (Howe, 1997; Pipe, 1996) show that children's testimony is most likely to be accurate when the interviewing adult does the following:

- Phrases questions using words the child can understand (Goodman, 2006)
- Has had no contact with the child before the investigation
- Uses neutral language and does not ask leading or suggestive questions

Even children younger than 5 years can provide accurate information if these rules are followed (Pipe et al., 2004). But if interviewers violate these rules, children may construct false memories. When that happens, it will be almost impossible to undo the damage and determine what parts of the memories are real. In most cases, children who construct these memories are sincerely trying to do what is right—there is no intentional lying involved.

LAURA DWIGHT/PHOTOEDIT, INC.

Eager to Please

Children crave the approval of adults. This desire to please makes it more likely that children will remember things the way they think an adult wants them to.

Recovered Memories

Perhaps you know something about recovered memories from watching the talk shows on daytime television because this issue has received a great deal of attention in such forums. Celebrities such as Roseanne Barr have claimed that, as adults, they recovered long-repressed memories of childhood abuse. They argue that the trauma of abuse caused the memories to be repressed—buried in the unconscious mind—only to be recovered when triggered by some event years later.

The one indisputable fact in this issue is that childhood physical and sexual abuse unfortunately occurs, with devastating effects on the victims. Beyond this, things become murkier. Many sincere, legitimate therapists are convinced that some of their patients have experienced such repression and that they have helped them recover these memories through therapy. Other psychologists are skeptical, however, and worry that well-meaning therapists are leading suggestible people into constructing false memories. Can research on memory help shed light on the truth? Let's break it down into two specific questions:

1. *Can repression of memories occur?* In other words, can a memory of a traumatic event be lost from consciousness? To find out, one researcher (Williams, 1995) located more than 100 adult women who were documented victims of sexual abuse as children. When interviewed, most women did recall the abusive event, but more than a third of them were not able to. Sometimes they recalled other abusive events or were confused about the event in question. Although the victims may have been too young to remember, this research at least leaves the door open—repression of traumatic events may be possible. And if it is possible to repress the memories into unconsciousness, it may also be possible to recover them.
2. *Can recovered memories be false?* Some therapists, unfortunately, use techniques that seem to increase the likelihood of false memories. As reports of childhood abuse became more common in the 1980s and 1990s, some therapists believed it was important to frame questions in

Recovered Memory?

The controversy over recovered memories has received widespread media attention because of the claims of entertainers like Roseanne Barr, who said that as an adult she recovered memories of childhood abuse. It has been impossible to determine under what circumstances such recovered memories are accurate or false.

SEAN ROBERTS/THE EVERETT COLLECTION

a way that tapped into the possibility of repression. Patients were told that "denial" and "repression" could happen easily. One popular book suggested, "If you are unable to remember any specific instances . . . but still have a feeling that something abusive happened to you, it probably did" (Bass & Davis, 1988, pp. 21–22). The techniques used to "uncover" memories include hypnosis (creating a state of suggestibility and asking the patient about possible past experiences), imagery (having the patient imagine and try to re-create possible past experiences), and dream analysis (exploring the patient's dreams for hidden hints of possible past experiences). In each of these techniques, therapists make suggestions to their patients, which we now know can lead people to unwittingly construct false memories. The authority and prestige of the therapist make these suggestions even more powerful.

These two conflicting lines of evidence leave the recovered-memory debate mired in an unsatisfying and potentially dangerous lack of clarity. Memories may be created, lost, and recovered, which seems to suggest that therapy could be used as a tool to identify previously undiscovered cases of child abuse. However, recovered memories are often inaccurate, and memories relating to events that occurred before the age of 3 (before most people's brains have matured enough to be physically capable of long-term storage) are especially likely to be inaccurate. If a therapist suggests childhood abuse as a possible source of adult difficulties, this suggestion may function as misinformation that produces false memories.

Victims of child abuse have suffered tremendously. Yet adults falsely accused of abuse based on the "evidence" of recovered memories have suffered, too. Families have been torn apart because of unprovable allegations of childhood abuse that may or may not be true. Perhaps psychological science will one day identify a more reliable way to sort out the false memories. For now, we clearly need to be cautious and avoid jumping to conclusions about recovered memories.

PAUSE NOW OR MOVE ON

Turn to page 424 to review and apply what you've learned.

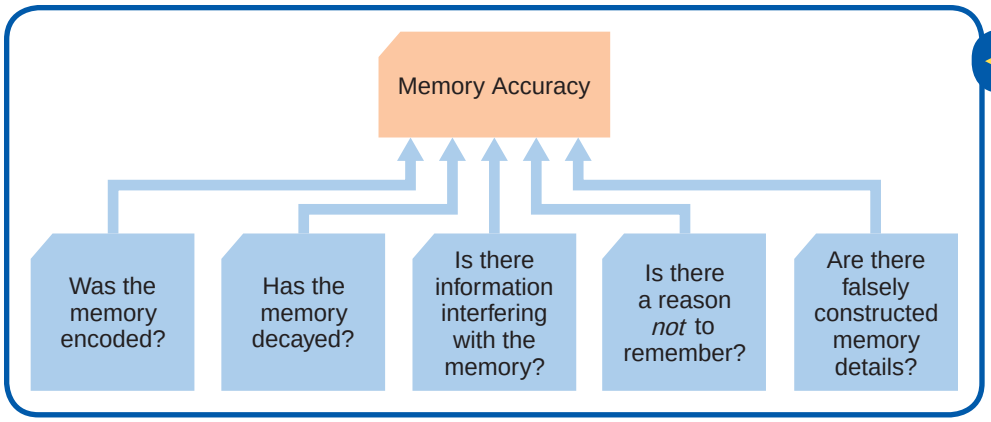

Memory Accuracy
Was the memory encoded?
Has the memory decayed?
Is there information interfering with the memory?
Is there a reason *not* to remember?
Are there falsely constructed memory details?

Figure 23.8
Don't Always Trust Your Memory!

Why aren't memories more accurate? Many factors contribute to the complicated process of memory. When you consider all that can go wrong, maybe the remarkable thing is that our memories are as accurate as they are.

Maybe it is the mysteries of memory that make it so fascinating. Our memories have tremendous power to keep the past alive. They can also deceive us (see **Figure 23.8**). Even experts suffer from falsely constructed memories. Famous child psychologist Jean Piaget remembered in detail an attempt to kidnap him in a park when he was a child. He had for years been grateful for his nursemaid's efforts to successfully foil the kidnapping. But as an adult, he learned that this vivid memory was false. He had constructed it from a story told by his nursemaid, who later admitted she had lied about the kidnapping attempt. We are accustomed to dealing with fact or fiction, yet memory seems to be fact and fiction, with no clear way to distinguish between the two. Should we trust our memories? *Yes,* but we should also be aware that they are not always reliable.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 23

Thinking About Forgetting and Memory Construction

Forgetting as Encoding Failure

WHAT'S THE POINT?

23-1 How does encoding failure lead to forgetting?

- Some information cannot be retrieved because it was not perceived as important enough to be encoded.

Apply What You Know

1. Which of the following instances of forgetting is mostly likely caused by encoding failure?
   a. not remembering the name of your third-grade teacher
   b. not remembering how many steps there are in your school's main stairway
   c. not remembering the birthday of your best friend
   d. not remembering the main character of *To Kill a Mockingbird* after studying the book in class

2. True or False: Most Americans can accurately identify details about U.S. coins even though they're not sure about their answers.

Forgetting as Storage Failure

WHAT'S THE POINT?

23-2 How does storage failure lead to forgetting?

- Some memories decay over time.
- Hermann Ebbinghaus's research indicated that most forgetting happens rapidly after initial learning and then levels off (the forgetting curve).

Apply What You Know

3. High school Spanish vocabulary is likely to be remembered for a half-century or more if a person still remembers it after
   a. 6 months.
   b. 30 days.
   c. 3 years.
   d. 10 years.
4. True or False: All memories eventually decay.

Forgetting as Retrieval Failure

WHAT'S THE POINT?

23-3 How does retrieval failure lead to forgetting?

- Retrieval failure—caused by interference or motivated forgetting—probably accounts for most forgetting.
- Interference occurs when information you learned in the past interferes with the recall of information you learned more recently (proactive interference) or when information you learned recently interferes with the recall of information you learned in the past (retroactive interference).
- Motivated forgetting occurs when forgetting provides protection from anxiety or from potentially distressing information.

Apply What You Know

5. Sigmund Freud believed that _____ led to motivated forgetting.
6. Saraugh, a seventh grader, tries to remember the name of her first-grade teacher but can only remember her fifth-grade teacher's name. This is an example of
   a. retroactive interference.
   b. misinformation effect.
   c. motivated forgetting.
   d. proactive interference.

Memory Construction

WHAT'S THE POINT?

23-4 How does memory construction contribute to inaccurate memories?

- Elizabeth Loftus demonstrated the tendency to construct memories, often falsely, because of the misinformation effect.
- Constructed memories and the misinformation effect have important implications for courtroom testimony, especially in regards to the accuracy of eyewitness testimony.
- Studies indicate that children may be especially prone to constructed memories and the misinformation effect.
- Reports of recovered memories (adult memories, often of physical and sexual abuse suffered as children) are controversial, and memory researchers continue to try to uncover the truth about this phenomenon.

Apply What You Know

7. Which of the following is the best analogy for memory?
   a. a DVD disc
   b. an encyclopedia
   c. a newspaper
   d. a jigsaw puzzle
8. True or False: Young children are more likely than older children to remember falsely.

KEY TERMS AND KEY PEOPLE

encoding, p. 411
storage, p. 411
retrieval, p. 411
permastore memory, p. 414
proactive interference, p. 415
retroactive interference, p. 415
repression, p. 417
misinformation effect, p. 419
Hermann Ebbinghaus (1850–1909), p. 413
Sigmund Freud (1856–1939), p. 417
Elizabeth Loftus (1944–), p. 418

Thinking and Intelligence

MODULES

24 Thinking

25 Intelligence and Intelligence Testing

This section might as well be titled, "What Makes Humans Human?" No species on the planet can match the power and flexibility of our thinking. Human intelligence has even allowed us to escape Earth and walk on the surface of the Moon. Most of us like to think, communicate, and solve problems; we're good at it. We can't swim as efficiently as sharks or fly with the soaring grace of eagles, but our cognitive skills allow us to construct submarines and airplanes, to survive in a multitude of environments (even high school!), and to strive to understand life's mysteries through the sciences and the arts. These topics are the ultimate human abilities.

MODULE 24

Thinking

I know there is very little resemblance between Auguste Rodin's famous sculpture titled *The Thinker* and me, but it turns out that thinking is something humans are very good at. We make our share of thinking mistakes, but our survival as a species is largely dependent on how well we conceptualize and solve problems.

Concepts

Problem Solving

- Algorithms
- Heuristics
- Insight

Problems Solving Problems

- Fixation
- Confirmation Bias
- Counterproductive Heuristics
- Overconfidence
- Framing

What is it that makes us human? Are there characteristics that separate us from other species, characteristics uniquely human that only we can claim? How about our thinking abilities? Indeed, in **cognitive abilities**—the mental activities associated with thinking, knowing, and remembering—humans have no equals. Consider that you spend your entire waking day in thought, from deciding what clothes to put on in the morning ("Does this shirt match my pants? It's cold—maybe I need a sweater."), to making the judgments necessary for safe driving, to ironing out differences of opinion with friends.

We organize and process vast amounts of information with ease. The processing of sensory information—of depth and color, for example, and the monitoring of balance, body temperature, and other internal systems—often takes place subconsciously, without our being actively aware that it's occurring. On the conscious level, we turn our

cognitive abilities All mental activities associated with thinking, knowing, and remembering.

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"You look like you have a lot on your mind, Jim!"

attention to solving countless problems in the course of a day. We exercise judgment regularly. We do make mistakes sometimes, but most of the time our thinking is remarkably accurate. Let's look at some components of thinking, a topic so central to psychology and being human that it has found a place in the title of this book.

Concepts

WHAT'S THE POINT?

24-1 How and why do we form concepts?

Psychologists define a **concept** as a mental group based on shared similarities. This definition differs from the more general definition of concept as "an idea" that we hear in everyday speech. Psychologists use the more precise definition of concept when they study the conceptual categories we form when we use our brain's built-in capacity to group objects, events, and people that share some similar characteristics. Your kitchen is more efficient with its various items sorted—silverware in one place, canned goods in another. Your brain also sorts information into conceptual categories. You have a concept for trees, another for bicycles, yet another for balls. These mental categories let you make instant judgments about new objects you've never seen before. When you come across a new tree, you know as quickly as you perceive it that it belongs in the concept category of tree (Grill-Spector & Kanwisher, 2005). You know this because it is similar (a bark-covered, wooden cylinder with branches and needles or, in the right season, leaves) to other trees you have seen. Effortlessly grouping objects into concepts certainly beats wondering, "Gee, what is that tall thing with the green top?"

Encountering new information for which you have no matching concepts is awkward. I can remember being invited to a friend's room during my first year in college. Steve had been given a beanbag chair. They had just been invented, and I had never seen one before. He said, "How do you like my new chair?" I actually argued that it wasn't a chair. My concept of chair included many kinds of chairs, but not beanbags. This glaring inability to classify the new object was memorable because we typically categorize almost effortlessly.

One of the ways we decide whether something belongs in a concept is by matching it with our **prototype,** a typical best example that incorporates the major features of a concept (Rosch, 1978). The closer the new object is to our prototype, the faster and more easily we can categorize it. We are quicker to recognize an oak tree as a tree than we are to assign a tiny Japanese bonsai tree to this category. Both qualify as trees, but the oak is much closer to our prototype—it is somehow more treelike than a bonsai (to us, at least; the Japanese bonsai grower might pause at the sight of a giant California sequoia). I struggled to identify my friend's beanbag as a chair because it was much further from my prototype than the desk chair and old armchair that furnished my dorm room. Some prototype biases are more serious. For example, we may not recognize an illness as quickly if the symptoms don't match our

concept A mental grouping based on shared similarity.

prototype A typical best example incorporating the major features of a concept.

PURESTOCK/GETTY IMAGES

BAMBU PRODUCTIONS/ICONICA/GETTY IMAGES

When Is a Chair Not a Chair?

We are quicker to recognize the item on the left as a chair because it more closely resembles our prototype than does the beanbag chair on the right.

prototype for that disease (Bishop, 1991). This can be a fatal error for people who don't realize they are having a heart attack because their symptoms don't match their prototype for this condition.

We develop *concept hierarchies* to keep mental information organized. Consider our hierarchy for organizing food in our culture. We begin by learning basic concepts like bread and cake. From there, we identify more specific concepts that fit under each of the basic ones—bread includes white bread, French bread, and banana bread, and cake includes angel food cake, sheet cake, and cupcakes. Bread and cake, in turn, fit into the larger category of baked goods. Similarly, we can break the basic concepts of cheese and milk into more specific concepts (cheddar, skim) or lump them into a broader concept (dairy products). This organizational hierarchy, which we begin to build as we learn the basic concepts (bread, cake, cheese, and milk) as young children, helps us process information about food quickly and efficiently. Grocery stores organize their products to take advantage of our understanding of broad categories, such as frozen food and canned goods. We develop similar hierarchies to deal with concepts as diverse as tools, vehicles, and recreation (see **Figure 24.1**). Our brains have a strong tendency to keep information neat and tidy. Most of us organize our computer files in a similar fashion, with folders representing a

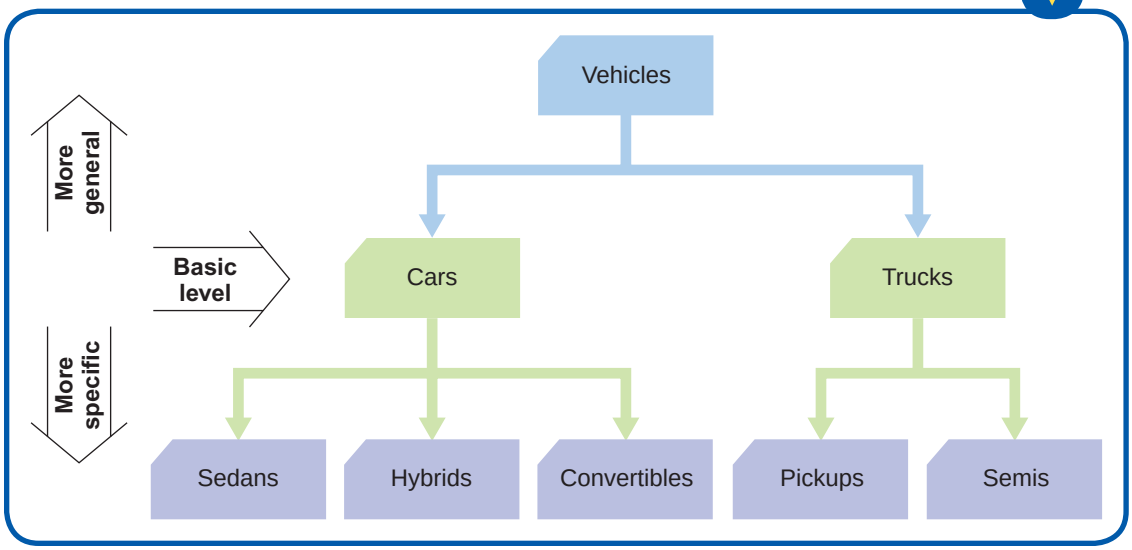


Figure 24.1
A Concept Hierarchy

Children use concept hierarchies to organize the world around them and learn about it. First, they master basic concepts (cars and trucks). Then, as their thinking becomes more sophisticated, they connect those basic concepts to both more general concepts (vehicles) and to more specific ones (hybrids).

few broad categories (school, music, correspondence, and so on) each containing more folders with ever more specific topics. When you organize your computer's folders and files, you are creating a hierarchy. (I wonder why the one on my computer is less organized than the one in my head.)

PAUSE NOW OR MOVE ON

Turn to page 437 to review and apply what you've learned.

Problem Solving

WHAT'S THE POINT?

24-2 What role do algorithms, heuristics, and insight play in the solution of problems?

Are there enough problems in your life? Probably so. Problems exist when something blocks you from achieving a desired outcome. If you need to get to school but are caught in traffic, that's a problem. If you want a B in your psychology class but are 30 points short, that's a problem. Problems can range from trivial (deciding which playlist to queue up) to serious (figuring out what path will allow you to achieve your career goals after graduating). We all have several strategies we apply when problems arise in our lives. Many of these strategies fall into the broad categories of algorithms and heuristics.

Algorithms

An **algorithm** is a problem-solving strategy that guarantees a solution to a problem. Here are some examples of algorithms:

- Applying the formula "length times height" to determine the area of a rectangle. Many mathematical formulas are algorithms.
- Systematically trying every possible combination on someone's locker until you come across the correct one.

algorithm A problem-solving strategy that guarantees the solution to a problem.

Algorithms and Heuristics

If your problem is to find a particular sports book as a gift for your younger brother, would you be better off systematically checking every book on every shelf—an algorithm—or starting in the sports section—a heuristic? If you're like me, you may even try another heuristic—asking for help.

KRZYSZTOF KWIATKOWSKI/ISTOCKPHOTO

- Checking every shelf of every aisle in a grocery store until you find the Gatorade.

As you can tell from these examples, algorithms are not always efficient. They may eventually yield a solution to the problem, but only after a long and tedious process. Knowing this, computer programmers may build algorithms into their software. The computers do the tedious work, and we benefit from the solutions.

heuristic A rule-of-thumb problem-solving strategy that makes finding a solution more likely and efficient but does not guarantee a solution.

insight The sudden realization (Aha!) of the solution to a problem.

Heuristics

A **heuristic** is a rule-of-thumb problem-solving strategy that makes a solution more likely but does not guarantee one. Here are some examples of heuristics:

- Using spelling rules such as "*i* before *e* except after *c*."
- Checking the canned-goods section of a grocery store to find a particular brand of baked beans.

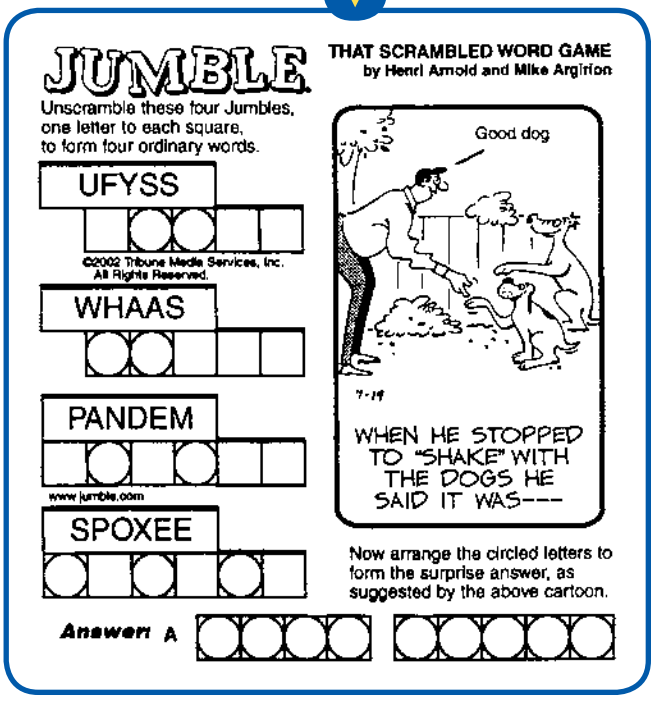
Heuristics are shortcuts. When they work, we are likely to reuse them the next time we need to save time and increase our mental efficiency in a similar situation.

Insight

Sometimes the solution to a problem pops into your head so quickly that you don't have time to use a problem-solving strategy. These wonderfully rewarding moments are examples of **insight,** the sudden realization (Aha!) of a solution to a problem. Typically, the answer is just there, with no prior sense that it's about to appear (Knoblich & Oellinger, 2006). Cartoons often express a moment of insight as a light bulb over a character's head. Insight is fun, satisfying, and one of the reasons most of us enjoy working on word jumbles and other types of mental puzzles—we experience a pleasing excitement when that answer pops into our head (see **Figure 24.2**). Researchers have discovered that the brain areas involved in insight are different from those involved in other kinds of problem solving (Sandkühler & Bhattacharya, 2008). Chimpanzees appear to share the ability to form insights with humans. In one classic study (Köhler, 1927), a chimp suddenly realized he could stack several boxes to form a platform from which he could reach bananas that had been suspended from the ceiling.

Figure 24.2
Insight

Enjoy the "Aha!" as the solutions to these jumbled words pop into your head (turn the page for the answers).


JUMBLE
THAT SCRAMBLED WORD GAME
by Henri Arnold and Mike Argirion
Unscramble these four Jumbles, one letter to each square, to form four ordinary words.
UFYSS
WHAAS
PANDEM
SPOXEE
©2002 Tribune Media Services, Inc. All Rights Reserved.
www.jumble.com
Good dog
WHEN HE STOPPED TO "SHAKE" WITH THE DOGS HE SAID IT WAS---
Now arrange the circled letters to form the surprise answer, as suggested by the above cartoon.
Answer: A
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PAUSE NOW OR MOVE ON

Turn to page 438 to review and apply what you've learned.

● Answers to Jumble puzzle in Figure 24.2: Fussy, awash, dampen, expose; A paws pause.

Problems Solving Problems

WHAT'S THE POINT?

24-3 How can fixation, confirmation bias, the use of heuristics, overconfidence, and framing influence the quality of our decisions?

Have you ever had trouble estimating how long a school project will take? Have you ever struggled to find a substitute for a broken shoelace? A variety of normal tendencies can hinder our ability to solve problems effectively. Many of them give us tunnel vision, preventing us from searching for alternatives that might offer terrific solutions. In this section, we look at five of these tendencies: fixation, confirmation bias, inappropriate use of heuristics, overconfidence, and framing. Knowing about these pitfalls will help you avoid them and become a more effective problem solver.

Fixation

We have a tendency to approach a particular problem in a particular way known as a **mental set.** Mental sets are often helpful because they are efficient and may lead to a rapid solution. Many chess players, for example, have a particular move they like to open with because they have learned it usually leads to a win. Mechanics often use a particular approach when diagnosing and repairing engine problems. Technical support team members learn mental sets to help them help customers with computer problems. They ask questions designed to focus on specific problems, usually beginning with basic, but sometimes overlooked, issues ("Is the computer plugged in?").

Sometimes, however, a mental set can get in the way. Instead of becoming an efficient problem-solving strategy, it becomes a **fixation**—a mental set that hinders the solution to a problem. Have you heard the expression "thinking outside the box"? It implies breaking away from routine, conventional ways of thinking—away from your mental set. Even though these old ways of thinking may have worked in the past, something new and different may now be required. Henry Ford was able to see that cars could be mass-produced by having workers specialize in a single task as an assembly line brought each vehicle past them. By thinking outside the box, he was able to manufacture cars far more cheaply than he could have if a small team of individuals had built one car at a time from the ground up. Ford revolutionized manufacturing by breaking free from old traditions. Can you break free from your own fixations? Find out by trying your hand at the puzzles in **Figures 24.3** and **24.4.** (Their solutions are in **Figures 24.6** and **24.7.**)

A special kind of fixation is known as **functional fixedness,** the tendency to think of things only in terms of their usual functions. What if you need to remove a screw, but you don't have access to a screwdriver? If you have trouble thinking of other things that can be used to perform this function, you are suffering

mental set The tendency to approach a particular problem in a particular way.

fixation A mental set that hinders the solution of a problem.

functional fixedness The tendency to think of things only in terms of their usual functions.

Problem	Given jugs of these sizes A	B	C	Measure out this much water
1	21	127	3	100
2	14	46	5	22
3	18	43	10	5
4	7	42	6	23
5	20	57	4	29
6	23	49	3	20
7	15	39	3	18

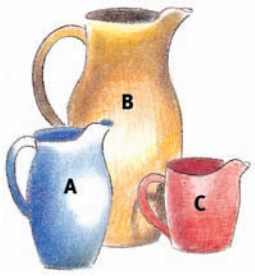


Figure 24.3
The Luchins Water Jar Problem

Can you measure out the amount of water in the right-hand column, using any of the three jars (A, B, and C) with volumes as shown in the middle column? The solution appears as Figure 24.6 on the next page. (From Luchins, 1946.)

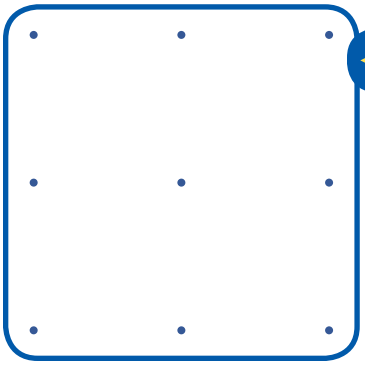


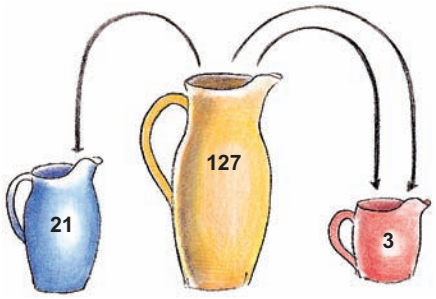
Figure 24.4
The Nine-Dot Problem

Make a copy of this figure on a piece of scratch paper (*not* in this book, please!) and try to connect all nine dots with four straight lines without lifting your pen or pencil from the paper or retracing a line. The solution appears as Figure 24.7 on the next page.

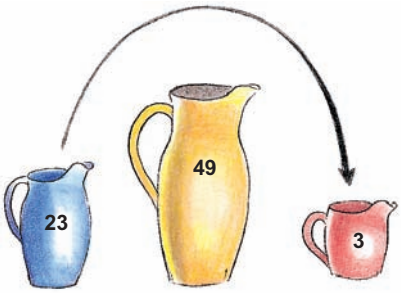
from functional fixedness. However, if you are mentally flexible enough to realize that a coin, a butter knife, the edge of a credit card, or a paper clip (among many other items) can all be used as a substitute screwdriver, then you are good at overcoming functional fixedness. If there's no molasses for the cookies, a clever baker substitutes honey. If there's no bracket for a loose tailpipe, a clever mechanic substitutes a coat hanger. If there's no toilet paper in the supplies box, a clever camper substitutes a leaf (a solution employed long ago by a friend of mine, who, unfortunately, had never learned to identify poison ivy). Finding new uses for duct tape has produced a cult following. Ready for a functional fixedness challenge? See **Figure 24.5** (and **Figure 24.8** for the solution).

Figure 24.5
The Candle-Mounting Problem

Can you think of a way to use these materials to mount the candle on a bulletin board? The solution appears as Figure 24.8 on the next page. (From Duncker, 1945.)



(Problem 1)



(Problem 6)

Figure 24.6
Solution to the Luchins Water Jar Problem

Problems 1 through 7 can all be solved by filling Jar B, then pouring off enough water to fill Jar A once and Jar C twice (desired volume = B – A – 2C). However, Problem 6 can be solved with a simpler formula (A – C), and so can Problem 7 (A + C). Many people miss these easy solutions because the mental set from the first several problems becomes fixated. Did your thinking stay flexible? (From Luchins, 1946.)

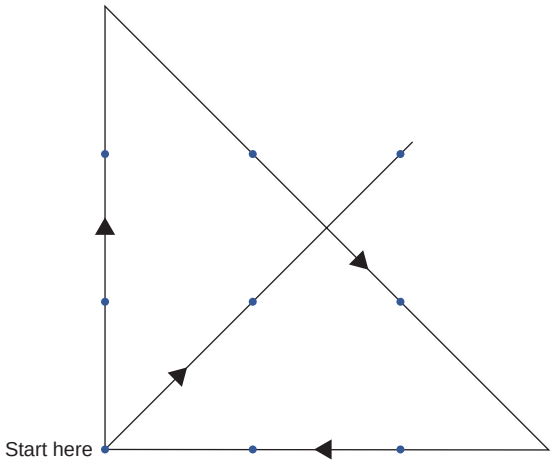


Figure 24.7
Solution to the Nine-Dot Problem

This problem literally requires you to "think outside the box." Only by leaving the square created by the outer dots can you solve the problem.

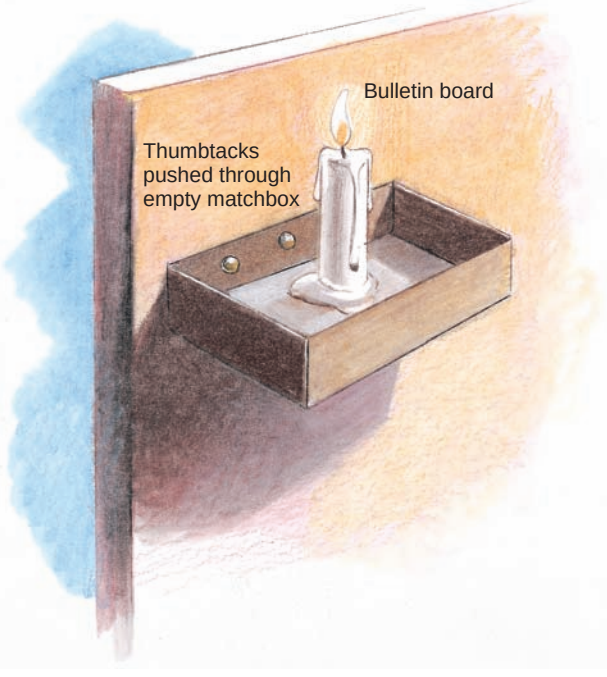


Figure 24.8
Solution to the Candle-Mounting Problem

If you could not imagine using the box as anything other than a container to hold matches, functional fixedness impaired your problem-solving ability. (From Duncker, 1945.)

Confirmation Bias

Confirmation bias is our tendency to focus on information that supports our preconceptions. I had a student drop by the other day because she was concerned about her grade in my class. She felt she must be doing better than the grade indicated. I sometimes make mistakes in calculating a student's grade, but in this case, the problem was hers. She was recalling accurately the quizzes on which she had done well, but she had forgotten several on which she had performed poorly at the beginning of the quarter. She knew she was a bright, capable student. This preconception made her more likely to notice (and remember) the quiz scores that confirmed this idea than the ones that refuted it. As a result, her own estimate of what her grade should be was inflated.

Confirmation bias can seriously affect juries in criminal trials. As testimony unfolds, each member of the jury begins to develop a hypothetical story to explain what happened. One juror may speculate, for example, that the defendant acted out of fear. From this point on, the juror will be more likely to notice testimony that supports this particular story and will be less likely to consider nonconfirming testimony. Once the testimony is complete and deliberations begin, the assembled jury is often surprised to learn that various members have generated (and confirmed) several different stories during the trial (Kuhn et al., 1994; Pennington & Hastie, 1993).

MICHAEL KELLEY/CORBIS

Confirmation Bias

As testimony unfolds, each member of this jury will develop a personal story to explain the crime and will then focus more on the evidence that supports that personal story. When the jury meets later to deliberate, the jurors may be surprised to discover how individual their stories are and how different pieces of evidence and testimony stood out as a result.

Counterproductive Heuristics

"Look before you leap." "A stitch in time saves nine." "Don't judge a book by its cover." No doubt you've been hearing expressions such as these since you were little. Such statements are designed to lead you to better decisions and judgment. Your elders wanted to give you guidelines that would help you survive and thrive in the world. These guidelines qualify as *heuristics,* those quick, rule-of-thumb problem-solving strategies we discussed earlier.

We all regularly use heuristics to get through the countless decisions we must make each day. Sometimes, however, our brain can fall in the trap of using seemingly helpful heuristics that actually lead us to inaccurate or harmful decisions. Amos Tversky and **Daniel Kahneman** (1974) identified several counterproductive heuristics. The **availability heuristic** estimates the likelihood of events based on their availability in our memory. Information that is readily available in our memory can indeed be a good indicator that an event is likely. When I hear thunder, I am quick to assume that rain will follow because I have many instances available in my memory when thunder signaled rain. Sometimes, however, the information available in memory is not such a good indicator.

The lottery commission in my state of Iowa intentionally uses the availability heuristic to influence people's judgment of their likelihood of winning.

ANDREAS RENTZ/GETTY IMAGES FOR BURDA MEDIA

DANIEL KAHNEMAN (1934–) Psychologist who, along with Amos Tversky, conducted research to discover factors that influence human judgment and decision making. He won the Nobel Prize in 2002 for this work.

confirmation bias The tendency to focus on information that supports preconceptions.

availability heuristic Estimating the likelihood of events based on their availability in memory.

CHRIS VANKAT/REUTERS/CORBIS

Availability Heuristic

Available images can distort our thinking. Many people buy lottery tickets regularly because images such as this one lead them to believe winning big is more likely than it actually is.

The commission does this by running ads and commercials featuring the gleeful winners. Often these winners are holding huge million-dollar cardboard checks and talking about the wonderful ways in which the money will improve their lives. These images are readily available in viewers' memories when they next think about playing the lottery. ("Big winners must be common because we see them on TV all the time!") Unfortunately, the commission does not show an equal number of dramatic images of those in a much more common category—lottery losers. As a result, many people greatly overestimate their chances of winning, which encourages them to play more than they otherwise would have. In these cases, the availability heuristic has clouded people's judgment.

Kahneman's work with Tversky on how such cognitive factors influence judgment led to a Nobel Prize in economics in 2002. It helps us explain how media coverage of plane crashes or shark attacks can lead us to overestimate the frequency with which these events occur. In circumstances like this, our reasoning is based more on our emotions and less on statistical probability (Slovic, 2007).

Overconfidence

More often than not, people overestimate the likelihood that they are correct. **Overconfidence** occurs when our confidence is greater than our accuracy. One study (Kahneman & Tversky, 1979) asked participants to estimate answers to factual questions by completing such statements as "I feel 98 percent certain that the population of New Zealand is more than _____ but less than _____." Did the instruction to be 98 percent certain produce answers that were correct 98 percent of the time? Not even close. People were able to "trap" the correct answer—3.7 million people—only two-thirds of the time. The gap between certainty (98 percent) and accuracy (66 percent) was nicely concealed by overconfidence. Even when participants are 100 percent certain of their answers, they are right only 85 percent of the time (Fischhoff et al., 1977).

It's not just experiments that produce overconfidence. Decisions tainted by overconfidence work their way into everyday life regularly. A friend of mine, psychologist Charles Brewer, often reminds people that "everything takes longer than it takes" to help dampen the frustration borne of overconfident planning. One study (Buehler et al., 1994) showed that students typically took twice as many days to complete a project as they originally predicted. I can relate. The writing I'm doing on this module tonight is taking much longer than I anticipated.

Why do so many of us appear "programmed" to make false, overconfident judgments so regularly? It may be a way to protect our well-being. Overconfidence is associated with happiness and making tough decisions more easily (Baumeister, 1989; Taylor, 1989). The overconfidence allows us to think everything will work out, and belief in our own judgment can keep us from fretting and stewing about things.

overconfidence When confidence is greater than accuracy.

Framing

framing How an issue is worded or presented, which can influence decisions and judgments.

Framing is the way we word or present an issue, and it can profoundly affect judgment. Framing the same issue in two different ways can produce two different results. Consider these two statements:

1. Condoms have a 95 percent success rate in preventing the spread of HIV, the virus that causes AIDS.
2. Condoms have a 5 percent failure rate in preventing the spread of HIV, the virus that causes AIDS.

The two statements are equally true, yet 90 percent of college students who read only the first statement rated condoms as effective. Only 40 percent did so after reading the second statement (Linville et al., 1992).

Can you imagine what would happen if ground beef were marketed as 20 percent fat instead of 80 percent lean? What if a surgeon bragged about a 2 percent death rate, rather than a 98 percent success rate? Framing makes a difference.

PAUSE NOW OR MOVE ON

Turn to page 438 to review and apply what you've learned.

Have you ever had an exasperated parent or teacher exhort you to "think!"? The next time it happens, you can honestly reply that you are thinking. To be human is to think. We hope this module has provided you with some ideas not for thinking more but for thinking better.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 24

Thinking About Thinking

Concepts

WHAT'S THE POINT?

24-1 How and why do we form concepts?

- Our mind uses concepts to organize the world into mental categories. These mental categories—including prototypes and concept hierarchies—usually help us think quickly and efficiently.
- Concept hierarchies keep mental information organized.

Apply What You Know

1. True or False: Concepts are useful for organizing information, but using them is time consuming and slows down cognitive processes.
2. Which of the following is a prototype for the concept "bird"?
   a. ostrich
   b. emu
   c. penguin
   d. robin

Problem Solving

WHAT'S THE POINT?

24-2 What role do algorithms, heuristics, and insight play in the solution of problems?

- An algorithm is a problem-solving strategy that guarantees a solution to a problem.
- A heuristic is a rule-of-thumb problem-solving strategy that makes a solution more likely but does not guarantee a solution.
- Insight is the sudden realization of a solution to a problem.

Apply What You Know

3. A(n) _____ for finding which key on a big key ring will start a car is to begin by eliminating all the keys that do not look like car keys.
4. A(n) _____ for finding which key on a big key ring will start a car is to systematically try each key in order until you find the one that fits.

Problems Solving Problems

WHAT'S THE POINT?

24-3 How can fixation, confirmation bias, the use of heuristics, overconfidence, and framing influence the quality of our decisions?

- A mental set is a tendency to approach a particular problem in a particular way.
- Confirmation bias is a tendency to focus on information that supports preconceptions.
- The availability heuristic estimates the likelihood of events based on their availability in memory. This can either enhance or hinder problem solving.
- Overconfidence occurs when confidence in an answer is greater than accuracy.
- Framing is the way an issue is presented or worded; it affects what solutions are thought of and produced.

Apply What You Know

5. Some people overestimate the odds of shark attacks because when shark attacks do occur they are widely publicized. This illustrates a counterproductive aspect of
   a. the prototype effect.
   b. framing.
   c. the availability heuristic.
   d. confirmation bias.
6. Attending a political debate and only remembering statements from the candidates you agree with is an example of
   a. confirmation bias.
   b. framing.
   c. overconfidence.
   d. the availability heuristic.

KEY TERMS AND KEY PEOPLE

cognitive abilities, p. 427
concept, p. 428
prototype, p. 428
algorithm, p. 430
heuristic, p. 431
insight, p. 431
mental set, p. 432
fixation, p. 432
functional fixedness, p. 432
confirmation bias, p. 435
availability heuristic, p. 435
overconfidence, p. 436
framing, p. 437
Daniel Kahneman (1934–), p. 435

MODULE 25

Intelligence and Intelligence Testing

The Nature of Intelligence
- Howard Gardner
- Robert Sternberg
- Emotional Intelligence

Intelligence Testing
- Alfred Binet
- Lewis Terman
- David Wechsler
- Group Tests

Test Construction
- Achievement and Aptitude Tests
- Reliability and Validity

Group Differences in Intelligence Test Scores

We all have brains, but we aren't all equally smart. As you will see, we aren't even smart enough to figure out exactly what being smart means, or how to measure it.

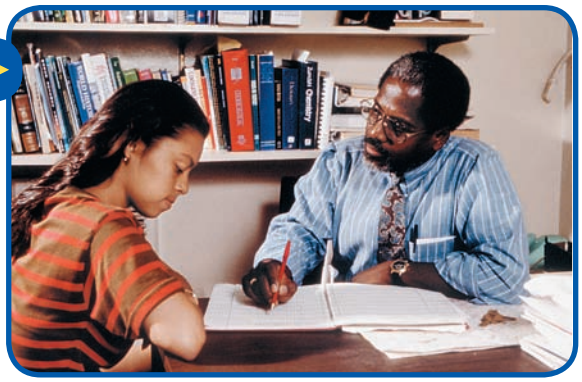
Think of some intelligent people. Do they share the same ways of thinking? Would your friends all agree that these people are intelligent, or do you think some might disagree? Questions such as these have challenged psychologists for more than a century. Here are the basic issues:

- What is intelligence?
- Where does intelligence come from?
- Can we use tests to reliably and validly measure intelligence?
- Are there ethnic or gender differences in intelligence test scores, and if so, what do the differences mean?

These important questions about intelligence have significance for society. Even though we can't fully answer some of these questions, the use of intelligence tests has grown dramatically since they were first introduced. You and most other high school students have probably taken intelligence tests many times as you worked your way through the school system. The results of those tests, with other standardized test scores, have

Do Your Scores Add Up?

Most schools use a program of standardized testing, including intelligence tests, to track the performance of students and identify problems that can be solved. Have you ever seen the scores in your guidance folder? You have a right to know what's in there, and this module will help you understand what you'll find if you choose to check it out.



MARY KATE DENNY/PHOTOEDIT, INC.

regularly been used to make decisions about students' future education. Let's see what we can learn about intelligence and the tests designed to measure it. Then perhaps you will be in a better position to reap their benefits and avoid their pitfalls.

The Nature of Intelligence

WHAT'S THE POINT?

25-1 How many kinds of intelligence are there?

What is intelligence? This is an easy question, right? Everyone knows what intelligence is. To be intelligent is to be smart, bright, with it, quick, and on top of things. Psychologists consider **intelligence** to be the ability to learn from experience, solve problems, and use knowledge to adapt to new situations. They disagree, however, about what this general definition actually entails. For example, we speak of intelligence as though it were one thing, but it may be more accurate to speak of *multiple intelligences*.

KRIS CONNOR/GETTY IMAGES

HOWARD GARDNER (1943–) Author of a contemporary theory of multiple intelligences consisting of eight separate kinds of intelligence.

Howard Gardner

One leading intelligence theorist, **Howard Gardner,** argues that there are at least eight independent kinds of intelligence, as illustrated in **Figure 25.1** (1983, 2006). Traditionally, schools have tended to emphasize "reading, writing, and arithmetic," which, in Gardner's model, are represented by *linguistic* and *logical-mathematical* intelligence. Gardner sees them as two different intelligences, which may explain why some students are good in math classes but not English classes, or vice versa. Schools may not place an equal value on other kinds of intelligence, such as an actor's *intrapersonal* abilities, a woodworker's *bodily-kinesthetic* skills, or a wildlife biologist's *naturalistic* intelligence.

Some critics argue that Gardner has moved well beyond what is normally considered to be intelligence, which is usually classified as mental ability. By adding things like musical ability and bodily-kinesthetic ability, these critics say, he is broadening the concept of intelligence to include areas that used to be considered skills or talents.

intelligence The ability to learn from experience, solve problems, and use knowledge to adapt to new situations.

	Intelligence	Examples
	Verbal-Linguistic	Reading comprehension Writing
	Logical-Mathematical	Solving math and logic problems
	Bodily-Kinesthetic	Balance Strength Endurance
	Visual-Spatial	Judging distance Map reading Geometry
	Musical-Rhythmic	Appreciating and creating music Music theory
	Interpersonal	Listening Cooperation Sensitivity to others
	Intrapersonal	Knowledge of self
	Naturalistic	Appreciating nature Ability to work with plants and animals

Figure 25.1
Howard Gardner's Multiple Intelligences

Gardner's theory proposes that each person has these eight independent kinds of intelligence. Being high in one kind of intelligence says little about your level in the other kinds of intelligence. (From Gardner, 1999.)

COURTESY OF DR. ROBERT STERNBERG

ROBERT STERNBERG (1949–) Author of a contemporary theory of multiple intelligences consisting of analytical, creative, and practical intelligence.

Robert Sternberg

Psychologist **Robert Sternberg** has a different way of organizing multiple intelligences. His theory (1985, 1999, 2003) defines three separate types of intelligence (see **Figure 25.2**):

	Intelligence	Examples
	Analytic	Analyzing Comparing Evaluating
	Creative	Inventing Designing
	Practical	Applying Using

Figure 25.2
Robert Sternberg's Three-Type Theory of Intelligence

Sternberg believes people have the three types of intelligence pictured here. (From Sternberg, 1999.)

emotional intelligence The ability to perceive, express, understand, and regulate emotions.

- *Analytic intelligence*—This is the kind of intelligence most often stressed in schools. It helps people do things like analyze, compare, and evaluate, and it closely matches most people's traditional view of intelligence. If you study published reports of various makes and models of cars to determine which would be the best purchase, then you have used analytic intelligence.
- *Creative intelligence*—Individuals high in creative intelligence can do things like create, invent, and design—they come up with new ideas and adapt to new situations. If you develop clever budgeting or borrowing strategies to be able to buy a new car, then you have used creative intelligence.
- *Practical intelligence*—Practical intelligence is the sort of common sense that helps you complete the various tasks you face. It allows you to apply, use, and do. If you successfully negotiate a great deal at the local car dealership, then you have used practical intelligence.

I once heard Robert Sternberg tell a joke to illustrate practical intelligence: Two men were walking through the North Woods when a large, mean-looking bear appeared on the other side of a clearing. One of the men sat down, opened his backpack, and took out his tennis shoes. When he started to change his heavy hiking boots for the lighter shoes, his friend said, "What are you doing? You can't possibly outrun that bear." The friend replied, "I don't have to outrun the bear; I only have to outrun you!" Now that's practical intelligence.

Traditional intelligence tests focus on analytic intelligence. They do a reasonably good job of predicting school grades, but they don't do a good job of predicting occupational success. There is a practical intelligence test that predicts managerial success more successfully than traditional intelligence tests do—it focuses on tasks like keeping workers motivated and writing effective memos (Sternberg & Wagner, 1993; Sternberg et al., 1995). Sternberg (2006, 2007) and his colleagues are also working on new, more comprehensive college admissions tests to better predict college success.

Emotional Intelligence

Yet another theory of intelligence, popularized in a book by Daniel Goleman (1995), distinguishes between academic intelligence and **emotional intelligence**—the ability to perceive, express, understand, and regulate emotions (Mayer et al., 2002, 2008). People with high emotional intelligence are more in touch with their feelings. They can face setbacks without losing their motivation or optimism, and they can manage their emotions in a way that allows them to get along well with others. Academic skills seem different from the social skills that flow from emotional intelligence. Perhaps this is why academically bright people are not much better than average folks when it comes to success in occupations, marriages, child-rearing, and maintaining mental health (Epstein & Meier, 1989). Psychologist John Mayer and his colleagues have now developed tests to measure emotional intelligence just as more traditional intelligence tests measure our more traditional concept of intelligence.

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"Hi—Where do I go to take the intelligence test?"

As you can see, psychologists have not yet reached a consensus about what, exactly, intelligence is. It's a complicated concept, and it won't be settled until more research is done. One question that has not been fully answered is whether some underlying factor fuels all types of intelligences (whatever they may be), much as AAA batteries can power up everything from flashlights to video

ELOY ALONSO/REUTERS/CORBIS

COURTESY OF DR. ROBERT STERNBERG

How Many Intelligences?

Howard Gardner of Harvard University and Robert Sternberg of Oklahoma State University are two of the leading cognitive psychologists in the United States today. Each of them believes it is accurate to speak of multiple intelligences, but they disagree on how many kinds of intelligence there are.

game controllers. More than a half-century ago, Charles Spearman proposed just such a factor, called **general intelligence,** or *g,* which he believed underlies all multiple intelligences. Spearman was impressed by the tendency of people who excelled in one area to also excel in others. Gardner, Sternberg, and others who emphasize multiple intelligences are more impressed by the different and separate nature of their various proposed factors. All these theories give us wonderful glimpses of what intelligence may really entail.

general intelligence *(g)* The factor that Charles Spearman believed underlies all multiple intelligences.

PAUSE NOW OR MOVE ON

Turn to page 456 to review and apply what you've learned.

Intelligence Testing

WHAT'S THE POINT?

25-2 How have intelligence tests developed and changed since they were first introduced?

Have you ever taken an intelligence test? Chances are that you have, but—if you're like many of my students—you didn't realize it. Most schools in the United States have a standardized testing program for their students, and some of these tests are indeed intelligence tests. Even though intelligence tests are widely used, there is much misunderstanding about what the tests can, and cannot, tell us. Let's continue our own quest for understanding by looking at the history of intelligence tests.

Alfred Binet

Testing has been around for a long time, but we can trace the roots of modern, standardized intelligence tests back to nineteenth-century France. That's when **Alfred Binet** developed the test that would lead to today's intelligence tests. At that time, France had new laws requiring education for all children.

COURTESY OF THE NATIONAL LIBRARY OF MEDICINE

ALFRED BINET (1857–1911) Developer of the first test to classify children's abilities using the concept of mental age.

Mental Age

Everyone in this group is 5 years old and will start school soon. They are not all the same, however. Some of them have more advanced mental abilities than others. Alfred Binet designed his tests to tap this quality—children's mental age—as contrasted with their chronological age (5 years, for these children).

BOB DAEMMRICH/PHOTOEDIT—ALL RIGHTS RESERVED.

mental age (MA) The chronological age that corresponds to the difficulty level of the questions a child can answer.

In the face of such overwhelming numbers, teachers needed an efficient way to place children in the proper classes. The French government was also concerned that some teachers would be biased in their placement of students. Wouldn't it be better to give each child a fast and fair test? Government officials asked Binet and a colleague, Théodore Simon, to develop a test that could spot any student likely to struggle in an age-grouped classroom.

Binet and Simon started by assuming that children's intellectual abilities grow year by year. Thus, a typical 7-year-old should be able to answer harder questions than a typical 6-year-old, a typical 8-year-old should answer harder questions than a typical 7-year-old, and so on. However, not every member of each age group is typical—some 7-year-olds can successfully answer questions that are usually appropriate for 8- or even 9-year-olds. Other 7-year-olds may struggle with questions most 6- or even 5-year-olds can easily answer.

Binet and Simon used these assumptions to measure **mental age (MA),** a shorthand description of the difficulty level of the questions a child can answer. Thus, a child who can answer 8-year-old questions has a mental age of 8, no matter what the child's *chronological age* (actual age) is. Binet and Simon predicted that children who fell significantly behind their agemates in mental age were the ones who would struggle in an age-grouped classroom. Even at this early time, Binet was concerned that his test, developed for such noble purposes, would be used to label some children as "backward" and to limit their opportunities (Gould, 1981).

NEWS SERVICE, STANFORD UNIVERSITY

LEWIS TERMAN (1877–1956) Adapted Binet's tests for use in the United States as an intelligence test that reported intelligence as a calculated IQ score.

Lewis Terman

Binet was right to be concerned about future applications of his tests. Those who followed him were convinced that intelligence was largely determined by genetics, which meant they were less interested in providing remedial programs for less capable students. Binet, believing that intelligence is determined mostly by environment, felt that slow children could be provided exercises to help them increase their mental abilities.

Stanford University's **Lewis Terman** was one psychologist who disagreed with Binet and believed that intelligence was reasonably fixed. Terman revised

intelligence quotient (IQ) The number that results from dividing mental age by chronological age and multiplying by 100.

the original Binet and Simon test for use with American children. The revision was called the *Stanford-Binet intelligence test,* and a modern version is still in wide use today. Terman, in collaboration with William Stern, devised a way to express an individual's performance on the test with a single, easy-to-interpret number. The **intelligence quotient (IQ)** is the number that results from dividing mental age (MA) by chronological age (CA) and multiplying by 100. This formula was as famous in psychology as Albert Einstein's $E = mc^2$ was in physics—and it became widely known by the public. IQ was calculated as follows:

$$\text{IQ} = \text{MA/CA} \times 100$$

This means a child whose mental age (MA) and chronological age (CA) matched (in other words, a child with average mental development) would have an IQ score of 100. Children whose mental age had advanced beyond their chronological age would have an IQ score above 100. For example, a 10-year-old child who could answer questions suited to the average 11-year-old would have an IQ of 11/10 × 100, or 110. Similarly, a child who lagged behind agemates in mental development would slip below 100. An 8-year-old who could answer only 6-year-old questions would have an IQ of 6/8 × 100, or 75. This simple measuring stick proved handy and easy to apply.

Modern intelligence tests all use this same basic technique—comparing a person's actual age with that person's level of mental development. Scores are adjusted so that 100 represents average intelligence for the person's age group. The original formula, however, is no longer used. And the term "IQ" is now shorthand for "intelligence test score." One problem with the formula is the assumption that mental abilities increase a little every year; this statement holds true only for children. If a 12-year-old boy attempts to learn calculus and finds it too difficult, it makes sense for him to wait a few years and try again—his mental abilities will continue to grow during his teen years. But if a 20-year-old man finds calculus too difficult, waiting probably won't increase his chances of becoming a math whiz—material that is too hard at 20 will probably remain so. This leveling-off process caused problems when people became interested in giving IQ tests to adults as well as children. An average 20-year-old woman would have an IQ of 100, calculated by dividing 20 (MA) by 20 (CA) and multiplying by 100. By age 40, however, her IQ would drop to 50 because her chronological age has doubled but the mental age has stayed the same.

Beyond the problem of adjusting for adult scores, the notion of an IQ formula is perhaps too simplistic. It reduces the complex concept of intelligence to a single number without considering other characteristics that can influence its interpretation. As public interest focused on the new IQ scores, people began to draw inappropriate conclusions: "Your IQ is 103? Hah—mine is 104. I'm smarter than you are!" These conclusions were particularly destructive when averages from one ethnic group were compared to those from another. Terman's personal beliefs fostered such comments.

Unlike Binet, Terman assumed intelligence was largely fixed by heredity—he lined up on the nature side of the nature–nurture debate. He also worked hard to promote the wide use of IQ testing, and his goal was to discourage the spread of what he called "feeble-mindedness" (intellectual weakness) through indiscriminate "breeding" (Terman, 1916). Terman and others

shared the belief that measured differences in IQ among various ethnic and national groups were largely inborn, and these beliefs partially accounted for the restrictive U.S. immigration policies of the 1920s. Policymakers never considered cultural and personal factors that might have accounted for the differences. Terman later acknowledged that such factors were significant, but his early belief that people could and should be categorized by the IQ averages of their native country shows how easily values and beliefs can influence science.

David Wechsler

ARCHIVES OF THE HISTORY OF AMERICAN PSYCHOLOGY, DAVID WESCHLER COLLECTION

DAVID WECHSLER (1896–1981) Developer of the most widely used individual intelligence tests in the United States, which were the first tests to report scores for both verbal and performance intelligence.

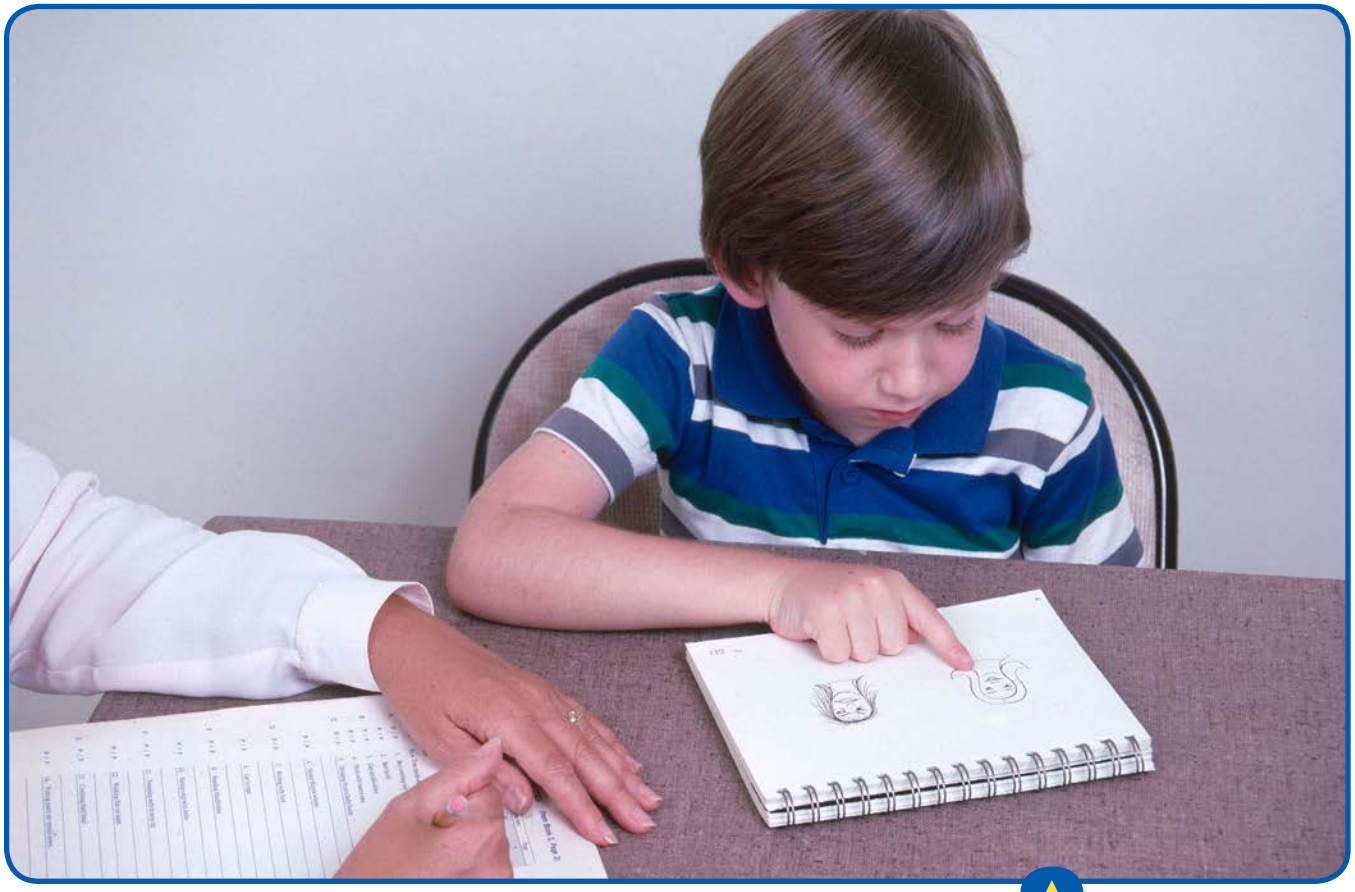
In the 1930s, **David Wechsler** began work on a battery of intelligence tests that have become the most widely used individual intelligence tests in the United States. The *Wechsler intelligence scales* introduced several innovations, including the following:

- *Different tests for different age groups*—Rather than trying to test all people with the same instrument, Wechsler developed three tests for different age groups: the Wechsler Adult Intelligence Scale (WAIS), the Wechsler Intelligence Scale for Children (WISC), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI).
- *Separate scores for verbal and nonverbal abilities*—In addition to providing an overall intelligence score, the Wechsler tests divide intelligence into verbal and performance categories. The verbal intelligence section tests vocabulary, math, and similar skills. The performance section tests abilities on tasks such as the assembly of objects.
- *Subtests*—The Wechsler tests are really a battery of about a dozen subtests, some of which tap verbal abilities and others performance abilities. Each subtest is scored separately, so people using the results can more easily determine the test-taker's strengths and weaknesses.

Taking an Intelligence Test

In individual intelligence tests, such as the Wechsler tests, the tester works one-on-one with the person taking the test. This child is working on the block design subtest of the Wechsler Intelligence Scale for Children. The tester has set up the equipment and will time the child as one measure of performance.

BETTMANN/CORBIS



LEWIS J. MERRIM/SCIENCE SOURCE

Figure 25.3
The Stanford-Binet Intelligence Test

Here, a young boy takes the Stanford-Binet intelligence test one-on-one with a tester.

Both the Stanford-Binet (**Figure 25.3**) and the Wechsler tests are individual intelligence tests, which means that a trained examiner gives the test to one person at a time. The tests are periodically revised to remain current and competitive with one another. It is a little like the competition between Coke and Pepsi—just as those two major brands of cola account for most of the market, these two tests account for most of the individual intelligence tests given in the United States. (For more on extreme scores for these tests, see Psychology in the Real World: Extremes of Intelligence—The Ends of the Normal Curve.)

Group Tests

Although the Stanford-Binet and Wechsler tests are the most widely given individual intelligence tests, most people have never taken either of them. The tests given so regularly in many school districts are *group intelligence tests*. These tests were originally developed by the U.S. Army in the early 1900s to help evaluate the massive number of recruits during World War I. The army uses these tests because they are efficient. Many people can take them at one time, using nothing more than a test booklet and an answer sheet. The person supervising the test needs no extensive training, which is required for people who give the individual tests. Scoring is equally easy, with the help of an answer key or a computer program.

Psychology in THE REAL WORLD

Extremes of Intelligence—The Ends of the Normal Curve

Most people score near the middle of the range of human intelligence, but what about those who are far below, or far above, the middle? If you look at **Figure 25.4,** you will see that intelligence test scores show a normal distribution, or bell-shaped curve. In any *normal distribution,* whether of intelligence test scores or some measure of friendliness, most scores pile up near the middle—the farther you move from the middle, the fewer people are represented.

About 2 percent of the population has an intelligence test score below 70. According to the American Psychiatric Association (1994), half of this 2 percent has an intellectual disability, defined as having a score of less than 70 and difficulty adapting to the demands of independent living. (Note that intellectual disability was formerly referred to as *mental retardation.*) Within this category, individuals are further classified as having mild, moderate, severe, or profound disability (see **Table 25.1**). Notice that most individuals with intellectual disability are in the mild category and that most people with mild disability can, with proper training, lead largely independent lives. People with moderate disability often thrive living in group homes and doing productive work in sheltered workshops. Independence is limited or impossible for people with severe and profound disability.

THE HUTCHINSON NEWS, PATRICK TRAYLOR/AP IMAGES

Nothing Gets Him Down

Lucas Wondra's Down syndrome may be his least interesting attribute. He's shown here signing "Dad" to his father while they look through a scrapbook of the scouting experiences that led to his Eagle badge.

What causes intellectual disability? Hundreds of factors can contribute, including genetics (Down syndrome is caused by an extra chromosome) and problems

Figure 25.4
Intelligence and the Normal Distribution

This graph shows how often various intelligence test scores occur in the general population. The average score is 100, and about two-thirds of the population score within 15 points of this average. The further from average you get, the fewer people achieve that score. It is rare to have scores below 55 or above 145.

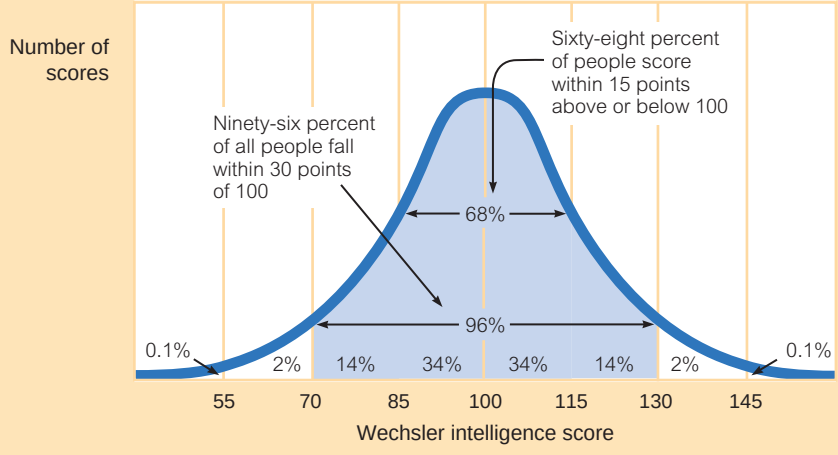


Table 25.1

Degrees of Intellectual Disability

Level	Typical Intelligence Scores	Percentage of Persons With Disability	Adaptation to Demands of Life
Mild	50–69	85%	May learn academic skills up to sixth-grade level. Adults may, with assistance, achieve self-supporting social and vocational skills.
Moderate	35–49	10%	May progress to second-grade level academically. Adults may contribute to their own support with employment in sheltered workshops.
Severe	20–34	3–4%	May learn to talk and to perform simple work tasks under close supervision but are generally unable to profit from vocational training.
Profound	Below 20	1–2%	Require constant aid and supervision.

Source: Adapted from the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision. Copyright 2000 American Psychiatric Association.

during pregnancy (excessive use of drugs or alcohol can have an effect) or childbirth. Environmental problems, such as malnutrition during childhood, can also produce disability.

On the opposite end of the normal curve are those who score above average on intelligence tests. There is no universally agreed-on definition for *genius,* but psychologists have extensively studied high-scoring individuals. Lewis Terman in 1921 began the most famous of these studies, tracking 1500 California schoolchildren with scores higher than 135. Stereotypes about exceptionally bright children being "nerdy," deficient in social skills, or unhealthy proved untrue as their lives played out over seven decades. These high-scoring children were healthy and well adjusted in school, and as adults they generally succeeded in such challenging professions as law and medicine (Holahan & Sears, 1995).

Intelligence tests are important tools that help psychologists measure a quality we all share. Fascinating people populate the entire range of intelligence.

Chess Champ

At the age of 10, Fabiano Caruana was already a candidate for grand master of chess, a distinction he later received as a mere 14-year-old. Here, he won 14 matches out of the 15 he had been playing simultaneously. His rare intellectual skills would probably be reflected in a high intelligence test score indicating genius.

AP/WIDE WORLD PHOTOS

It is this tremendous efficiency that makes group tests appealing to schools, too. Schools cannot afford to hire trained testers to give individual tests to each student, but most school budgets can cover group tests administered in a classroom under the supervision of teachers. The answer sheets can be sent to the test supplier for economical computer scoring. And there are lots of choices available, including the Cognitive Abilities Test, the Differential Aptitude Test, and the Otis-Lennon School Ability Test. If the Stanford-Binet and Wechsler individual tests are comparable to Coke and Pepsi, the various group tests more closely resemble the wide array of makes of automobiles. The U.S. Army sticks with its original vehicle—the Army Alpha test—to evaluate recruits.

But there is a trade-off with group tests. Their economic efficiency comes at the cost of test reliability. We cannot count on the results of these tests to the same extent that we can count on the results of individual tests. Most school districts compromise by using both kinds of tests. Every child takes a group test every year or two through the elementary school years. If the results fall within the normal range, the results are filed away and nothing further is done. However, if the test indicates some problem because of a low score, most districts follow up by having the school psychologist administer the more expensive (but more reliable) individual test, usually the Wechsler or the Stanford-Binet. If that test also indicates special needs, school officials may recommend special programming for that child.

But a question remains: What makes one test more reliable than another? To answer that question, we need to look at test construction.

PAUSE NOW OR MOVE ON

Turn to page 456 to review and apply what you've learned.

Test Construction

WHAT'S THE POINT?

25-3 What do aptitude tests and achievement tests measure? How are these intelligence tests evaluated?

Probably no generation in the history of the world has been tested as much as yours. Can you remember when you took your first test? Probably not. If you were born in a hospital, as my sons were, chances are good that you were tested within the first minute of your life. Newborns are given the Apgar test to determine their overall physical condition and whether medical intervention is necessary. My older son, Carl (who has grown up fine and healthy, I'm happy to say), "failed" this early test—because he was not breathing! After your Apgar, the tests came fast and furiously, as people checked your hearing

SPENCER GRANT/PHOTOEDIT, INC.

BOB DAEMMRICH/PHOTO EDIT

SPENCER GRANT/PHOTOEDIT, INC.

Tests and More Tests

It's hard to get through a day without being tested for something.

and vision, watched you swim to determine whether you could go in the deep end of the pool, assessed your readiness for kindergarten, judged your intelligence, measured what you had achieved in the classroom, and put you behind the wheel of a car to watch you drive. And your tests aren't over yet—you can still look forward to high school exit exams, college entrance exams, graduate school admissions exams, and various professional tests, like the bar exam required of lawyers or the certificate exams to become a master electrician. Is it any wonder we all become tired of being tested? But because we can't avoid them, let's try to understand the general principles behind test design and applications.

Achievement and Aptitude Tests

One major way of characterizing tests is to distinguish between those that assess achievement and those that gauge aptitude. **Achievement tests** attempt to *measure* what the test-taker has accomplished. The classroom tests you take regularly measure how much you've achieved in your various units of study. Standardized achievement tests that you and other students around the country take are attempts to determine what each of you has accomplished in relation to your classmates. These standardized achievement tests also help schools know how their students are doing in comparison with state and national groups.

Aptitude tests attempt to *predict* the test-taker's future performance. College entrance exams like the ACT (American College Test) and the SAT Reasoning Test are both aptitude tests. Intelligence tests are also considered aptitude tests because they attempt to assess the test-taker's ability to learn.

Reliability and Validity

Have you ever taken a test with unfair questions? Almost every student has. Knowing this, psychological testing experts have worked hard to eliminate problems, especially from standardized tests used to make decisions about individuals' futures. Good tests—those that are well designed—are both reliable and valid.

achievement tests Tests that attempt to measure what the test-taker has accomplished.

aptitude tests Tests that attempt to predict the test-taker's future performance.

Ever Taken an Unfair Test?

Psychologists avoid unfair tests by making sure they are both reliable and valid.

SPENCER GRANT/PHOTO EDIT

Test Reliability

In tests, **reliability** is the extent to which a test yields consistent results. If a test is reliable, then the results will be the same no matter who gives the test. Just as a reliable friend is one you can count on, so is a reliable test. Here are some ways that test designers assess whether a test is reliable:

- *Does it have test-retest reliability?* If so, a person who retakes a test will get almost the same score the second time as the first. For example, if you take an intelligence test twice in three months, your score should be roughly the same each time.
- *Does it have split-half reliability?* If so, your score on the even-numbered items should be about the same as your score on the odd-numbered items. For example, if I give you a 100-question multiple-choice test, you should have about the same number of correct answers on the odd-numbered questions as you do on the even-numbered questions.
- *Does it have scorer reliability?* If so, two people should be able to score the same test and show the same result. My co-author and I, given two identical copies of your exam, should give you the same grade.

Test Validity

Validity is the extent to which a test measures or predicts what it is supposed to. What if I designed a test to measure your intelligence by checking your hat size? I could do this fairly reliably—I would have consistent answers every time I checked the size tag on the inside of your hat. Would you be satisfied with my statement about your intelligence? Maybe—if you have a really big head! But most people would object, saying that this is a bad test. And they'd be right. This is not a *valid* test of intelligence because people with big heads are not necessarily more intelligent than people with small heads. This test does not measure what it is supposed to measure. Reliability alone does not guarantee a good test.

One of the best indicators of test validity is a test's ability to make accurate predictions. College admissions tests are considered somewhat valid because they do a tolerably good job of predicting how well a student will do

reliability The extent to which a test yields consistent results, regardless of who gives the test or when or where it is given.

validity The extent to which a test measures or predicts what it is supposed to test.

in the first year of college. It is generally true that students who do well on the tests are those who also do well in college. There are enough exceptions, however, that the use of college admissions tests remains controversial.

Notice that you cannot determine whether a test is valid *unless you know its purpose.* A test can be valid for some purposes but not for others. Intelligence tests, for example, have more validity for predicting how well children will do in elementary school than they do for predicting occupational success for adults. It's interesting that the purpose for which Binet developed the first test—predicting school success—is still the one that is most valid.

PAUSE NOW OR MOVE ON

Turn to page 457 to review and apply what you've learned.

Group Differences in Intelligence Test Scores

WHAT'S THE POINT?

25-4 What causes the differences in IQ among different groups of people?

Can tests be biased? Can they put certain individuals at a disadvantage because of their gender, race, or cultural background? Psychologists who design tests are concerned about these questions because some groups tend to outscore others on some tests. Males do better than females on tests of math problem solving (Hedges & Nowell, 1995). Israeli Jews do better than Israeli Arabs on intelligence tests (Zeidner, 1990). Israeli Arabs, like black Americans, are a minority group within a larger, dominant culture. In the United States, as in Israel, the minority group's scores are often lower. In 1994, a group of more than 50 researchers (Arvey et al., 1994) looked at a series of studies and concluded that the average score for black Americans was roughly 15 points lower than for white Americans. Some evidence indicates that this IQ gap has closed to about 10 points among children tested more recently (Dickens & Flynn, 2006; Neisser et al., 1996). But the bigger question is why this gap appears. Group differences like the three cited here deserve close study so that we don't leap to inappropriate conclusions about the people involved. It is interesting to note that 80 years ago, the average intelligence test score was only 76 points by today's standards. This historic increase, known as the Flynn effect because of James Flynn's research on the phenomenon (1987, 2007), has been observed worldwide in rising performance in 20 countries (Daley et al., 2003). Few would suggest that today's group of test-takers are inherently more intelligent than were their great-grandparents.

So, are the tests biased? Are they testing intelligence or something else? We know that different groups in the United States have different experiences

Group Differences in Intelligence Test Scores

On some intelligence tests, different groups have different average scores. The question is, why? Most psychologists believe that environmental factors, not heredity, account for these group differences.

JEFF GREENBERG/THE IMAGE WORKS

as participants in American society. Do members of disadvantaged minority groups have the same kinds of experiences that the mostly white, middle-class Americans who designed these tests have? Probably not. So, to the extent that these tests require a knowledge of mainstream American culture, the tests are not valid intelligence tests. In that sense, the tests are biased. Lower scores on the part of some groups reflect the fact that those groups have not had the same kind of "preparation." Notice that we are talking about group differences here and that scores among the individuals within each group vary tremendously. Some black American children score higher than almost all white American children, and some white American children score lower than almost all black American children. We cannot predict how any individual child will do based on the group the child comes from—just as we cannot predict how long any individual person will live, even though we know that women, in general, live longer than men.

So, does heredity also play a role in racial differences on intelligence test scores? Look at what psychologists have discovered about the extent to which intelligence is inherited. This area, as much as any, illustrates the importance of the nature–nurture debate. Is intelligence determined by *nature*—the inborn influence of heredity—or is it determined by *nurture*—the influence of the environment we are raised in? The answer has profound significance for our society. If certain racial groups are likely to be less intelligent because of the genes they were born with, an argument could be made that they are less qualified to hold positions of responsibility. But if environmental factors cause the lower intelligence scores, no such argument can be made because the differences will disappear if opportunities become more equal. So, which is it—nature or nurture?

The answer is that both nature *and* nurture shape an individual's intelligence. How do we know this? We have been shown this by studies that used a number of techniques to untangle the threads linking environment and heredity to intelligence. Studies of identical twins, for example, are useful because identical twins share the same heredity (see **Figure 25.5**). Any differences between them cannot be genetic and must be environmental. Fraternal twins are no more genetically similar than any other brothers and sisters are. They are less similar in intelligence test scores than identical twins but more similar than nontwin siblings. Why? It's because twins—whether fraternal or identical—share a more similar environment, being exposed to a variety of

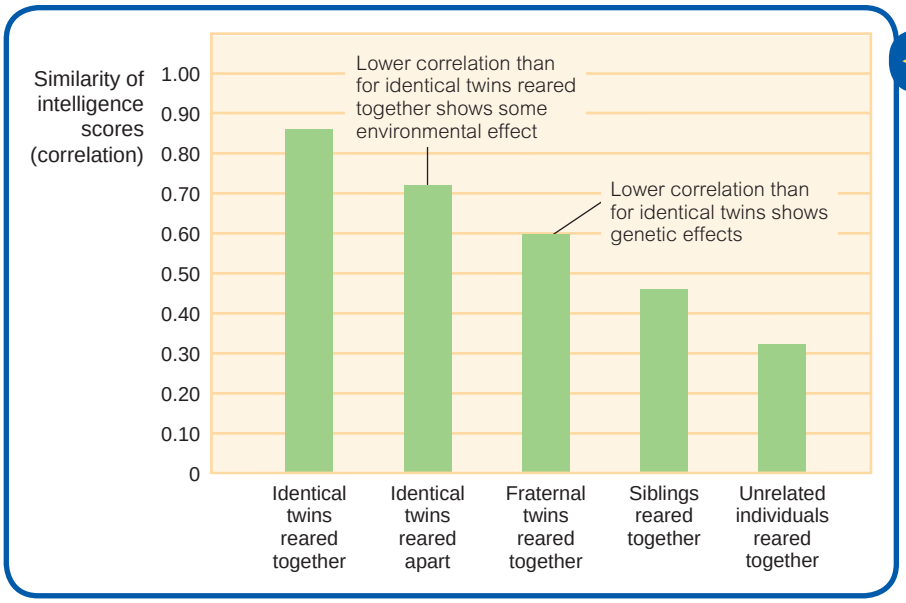
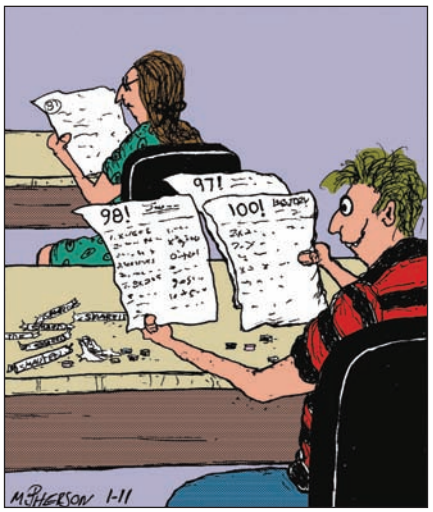


Figure 25.5
Twins and Intelligence

Twin studies show that intelligence test scores for twins are more similar than scores for either siblings who grow up together or unrelated individuals who grow up together. Environmental effects are apparent in the studies of identical twins reared apart. Heredity's role is apparent in studies of fraternal twins raised together. (Data from McGue et al., 1993.)

experiences together, than other siblings. Adoption studies are also useful. If an adopted child is more similar to the biological parents than the adoptive parents, there is support for the effect of heredity.

When we roll together the results of the studies of twins—those raised together and those raised apart, identical or fraternal—and of adopted children, it becomes clear that heredity plays a big role in our intelligence. But it also becomes clear that environment plays a role significant enough to explain why group differences exist. Genetics researchers (Cavalli-Sforza et al., 1994; Lewontin, 1982) have established that individual differences within a race are much greater than differences among racial groups. Racists have tried to find conclusive support in the research to establish that some groups are superior to others because of their genes, but the research doesn't exist. Just as you can't judge a book by its cover, you can't judge a human by color. After all, 99.9 percent of your genes are an exact match to those of every other human (Plomin & Crabbe, 2000). Similar problems arise when you try to analyze gender differences. Again, there is more variability within each gender group than between them, but males and females do show some differences in mental abilities. Girls, for example, show more verbal fluency (Halpern, 1997), and boys score higher when solving math problems (Hedges & Nowell, 1995). Some part of these gender differences may be biological, but differing social expectations for boys and girls certainly have an effect as well.



After taking daily supplements of Smarties™, Glenn discovers that they actually do increase one's IQ.

PAUSE NOW OR MOVE ON

Turn to page 457 to review and apply what you've learned.

The easy answers intelligence tests were supposed to provide have never been quite as easy as some hoped they would be. The unanswered questions about intelligence and the tests that attempt to measure it remain more interesting than the questions on the tests themselves.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 25

Thinking About Intelligence and Intelligence Testing

The Nature of Intelligence

WHAT'S THE POINT?

25-1 How many kinds of intelligence are there?

- Some psychologists consider intelligence to be one thing, and others conceive of multiple intelligences.
- Howard Gardner argues that there are at least eight independent kinds of intelligence.
- Robert Sternberg defines three separate types: analytic, creative, and practical intelligence.
- Daniel Goleman distinguishes between academic intelligence and emotional intelligence—the ability to perceive, express, understand, and regulate emotions.
- Charles Spearman proposed a factor called general intelligence, or *g*, which he believed underlies all multiple intelligences.

Apply What You Know

1. According to Howard Gardner, the ability to parallel park a car would represent
   a. naturalist intelligence.
   b. spatial intelligence.
   c. intrapersonal intelligence.
   d. bodily-kinesthetic intelligence.
2. Traditionally, schools place the strongest emphasis on Robert Sternberg's _____ intelligence.

Intelligence Testing

WHAT'S THE POINT?

25-2 How have intelligence tests developed and changed since they were first introduced?

- Alfred Binet and Théodore Simon developed the first intelligence test to help French educators place students in classes appropriate for their intelligence levels.
- Lewis Terman revised the original Binet and Simon test into the Stanford-Binet intelligence test. This test established the intelligence quotient (IQ) as the number that results from dividing mental age (MA) by chronological age (CA) and multiplying by 100.
- David Wechsler developed a battery of intelligence tests that have become the most widely used individual intelligence tests in America. The Wechsler intelligence scales include several innovations, including different tests for different age groups, separate scores for verbal and nonverbal abilities, and subtests for strengths and weaknesses.
- Many other intelligence tests are designed to be administered to groups.

Apply What You Know

3. Alfred Binet developed the first intelligence test to identify
   a. whether young people should apply for college or trade school.
   b. proper grade placement.
   c. individuals who needed remedial work in specific areas.
   d. individuals to ultimately serve in the French government.
4. Which of the following is a disadvantage of group intelligence tests?
   a. They are less reliable than individual tests.
   b. They are more biased than individual tests.
   c. They can only measure IQ, not general intelligence.
   d. They can only measure single and not multiple intelligences.

Test Construction

WHAT'S THE POINT?

25-3 What do aptitude tests and achievement tests measure? How are these intelligence tests evaluated?

- Achievement tests attempt to measure what the test-taker has accomplished.
- Aptitude tests attempt to predict the test-taker's future performance.
- Reliability is the extent to which a test yields consistent results.
- Validity is the extent to which a test measures or predicts what it is supposed to test.

Apply What You Know

5. A test that determines whether a person is likely to be successful in law school is an
   a. analytic intelligence test.
   b. achievement test.
   c. individual intelligence test.
   d. aptitude test.
6. True or False: A thermometer that consistently measures one degree too warm is reliable.

Group Differences in Intelligence Test Scores

WHAT'S THE POINT?

25-4 What causes the differences in IQ among different groups of people?

- There are group differences in IQ scores.
- Because different groups have different experiences, to the extent that intelligence tests require a knowledge of mainstream American culture, the tests may be considered biased.
- Both nature and nurture shape an individual's intelligence.

Apply What You Know

7. True or False: Nature refers to the impact that heredity has on intelligence.
8. Intelligence researchers believe that the IQ differences among racial groups can be best explained by
   a. genetic differences.
   b. the difference between mental age and chronological age.
   c. the effects of environment.
   d. low reliability for intelligence tests.

KEY TERMS AND KEY PEOPLE

intelligence, p. 440
emotional intelligence, p. 442
general intelligence *(g)*, p. 443
mental age (MA), p. 444
intelligence quotient (IQ), p. 445
achievement tests, p. 451
aptitude tests, p. 451
reliability, p. 452
validity, p. 452
Howard Gardner (1943–), p. 440
Robert Sternberg (1949–), p. 441
Alfred Binet (1857–1911), p. 443
Lewis Terman (1877–1956), p. 444
David Wechsler (1896–1981), p. 446

DOMAIN 6

Individual Variations

Motivation and Emotion

MODULE 26 Motivation

MODULE 27 Emotion

Personality

MODULE 28 Psychodynamic and Humanistic Perspectives on Personality

MODULE 29 Trait and Social-Cognitive Perspectives on Personality

Psychological Disorders

MODULE 30 Introduction to Psychological Disorders

MODULE 31 Anxiety and Mood Disorders

MODULE 32 Dissociative, Schizophrenic, and Personality Disorders

Ah, the beauty of the individual. Just as each rose is different from all other roses, each person exudes individuality. The seven modules in this domain celebrate the differences that make us all unique. How come we aren't all motivated to accomplish the same things? Why do you express emotion differently than your friends? What do the various psychological perspectives have to say about the development of personality? And what truly defines the pain and variety of psychological disorders that touch so many lives?

Despite the variations among us, almost everyone is fascinated by these topics. Let's dive in and explore the factors that make you you and me me!

Motivation and Emotion

MODULES

26 Motivation

27 Emotion

My tenth-grade English teacher froze after I said, "I think this poem is kind of stupid." She had just read to the class Robert Frost's "Stopping by Woods on a Snowy Evening," and she had asked for my opinion of this poem. My answer was not what she was looking for.

Composing herself, Ms. Stutzman calmly put down her chalk and walked over to my desk. With one of those I-feel-sorry-for-you looks teachers give when you've let them down, she matter-of-factly told the class, and me, "I don't think you would call the poem stupid if you understood it. Let me help you understand."

She proceeded to explain the emotion she felt when she read, "And I have miles to go before I sleep." Afterward, our assignment was to write a paragraph, due at the end of the period, explaining why we thought Frost wrote this poem. Was it because he wanted to describe a long trip he'd been on, or was it to express some kind of wisdom? In essence, we were to explain Frost's motivation for writing.

Psychologists—like my teacher Ms. Stutzman—are interested in motivation and emotion. In the next two modules, we will look at some ways in which psychologists study these two concepts, and we will review some of their most important research. The discussion should help you understand both concepts, so that if you're asked to explain either, you won't give the same response I gave to Frost's classic poem.

MODULE 26

Motivation

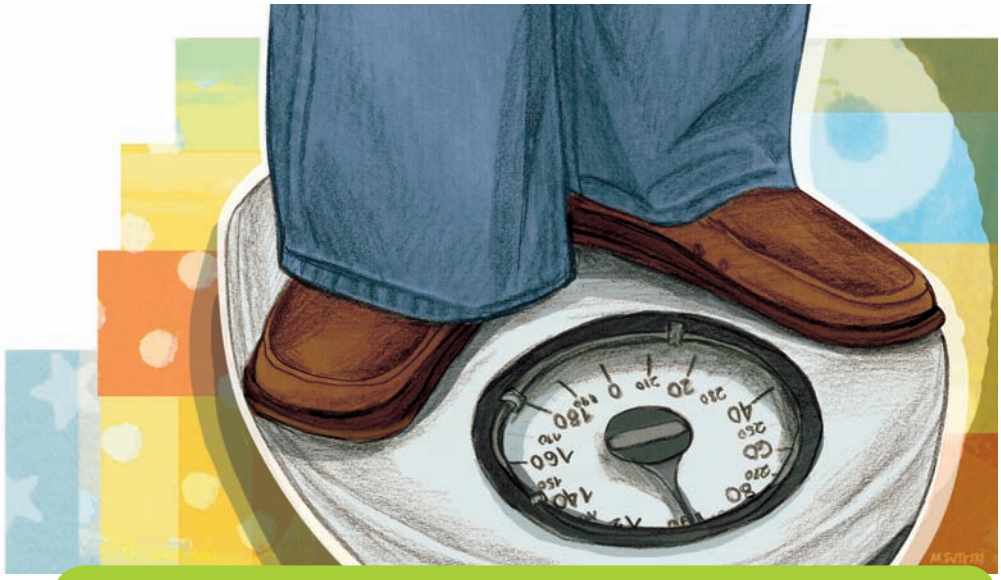
Historical Explanations
- Instincts
- Drives

Biological Explanations
- Arousal Theories
- Homeostasis

Cognitive Explanations

Clinical Explanations
- Hierarchy of Needs
- Achievement Motivation

Hunger: A Closer Look
- Physiology of Hunger
- Environment and Hunger
- Eating Disorders



The motivation to eat—or not to eat—can be both biological and cognitive. Let's see what psychologists have to say about what motivates us to do what we do.

On the morning of September 11, 2001, terrorists hijacked four U.S. passenger planes headed for the West Coast. They deliberately flew three of the aircraft into U.S. buildings, killing all passengers and thousands of people on the ground. The biggest criminal investigation in history followed this horrific crime.

As with most murder cases, investigators began by asking, "Why?" Why would anyone want to do something so devastatingly awful? What drove this suicidal attack? The investigators of the 9/11 attacks sought to understand the motives of the hijackers.

Ground Zero

Rescue workers were motivated to raise the American flag at the site of the World Trade Center devastation in New York City. What motivated the terrorists?

MARK LUDAK/THE IMAGE WORKS

For more than a century, psychologists have searched for the roots of behavior, attempting to understand why we do what we do. This quest to understand **motivation** (from the Latin *movere,* meaning "to move") has led psychology in several directions. In this module, we will examine biological, cognitive, and clinical explanations for motivation and explore how some of these ideas can help us motivate others and ourselves. Finally, we will look at our hunger motivation and how it goes awry in those with eating disorders.

Historical Explanations

WHAT'S THE POINT?

26-1 How did early psychologists explain human motivation, and what were the limitations of these theories?

The study of motivation is far from new to psychologists. Some of the earliest questions asked by psychological researchers involved trying to figure out why we do what we do. The earliest researchers in the field of motivation gathered information on instincts and drives.

Instincts

An **instinct** is an inherited complex behavior that is rigidly patterned throughout a species. Examples include the migration patterns of birds that fly south for the winter and the human infant's instinct to suck.

In the first published psychology textbook, William James (1890) listed 37 human instincts, including the "mental instincts" of jealousy, curiosity, and cleanliness. Thus, instinct theory was the original psychological explanation of motivation. Many theorists back then found James's list inadequate, so they kept adding instincts, such as the desire to dominate and the desire to make things. Eventually, the number of proposed instincts swelled to a

motivation A need or desire that energizes and directs behavior toward a goal.

instinct A complex, inherited behavior that is rigidly patterned throughout a species.

Thirst Quenching

Both the young woman and the cat have the same motive, but they inherited different ways to meet this need. The cat's behavior pattern is fixed, and it drinks only by curling its tongue backward as it laps water out of a container. With a more advanced nervous system, humans can learn a variety of ways to quench their thirst.

mind-boggling 10,000 (Bernard, 1924), making the study of instincts, shall we say, cumbersome. Further, instinct theorists fell into a trap by using instincts both to label and to explain a behavior. For instance, they might say that studying behavior would be explained by the studying instinct. And what's the studying instinct? Well, it's studying behavior. Given this circular reasoning, interest in explaining behavior through instincts understandably dropped off.

drive-reduction theory The idea that a physiological need creates a state of tension (a drive) that motivates an organism to satisfy the need.

Drives

Still searching for a way to explain motivation, psychologists looked hopefully at the study of *drives* (physiological needs). Consider the hunger drive, for example. Ever miss breakfast because you got up late? By 10:00 A.M., you're starving. Skipping your Wheaties creates an internal, physiological *need* for food, which leads to hunger, a psychological *drive*. The drive to eat and the need for food disappear after you eat lunch. **Drive-reduction theory** is the idea that a physiological need creates a state of tension (a drive) that motivates an organism to satisfy that need (see **Figure 26.1**). Eating and drinking are drive-reducing behaviors: Eating reduces the hunger drive, and drinking reduces the thirst drive.

Like instinct theory, drive-reduction theory had a great deal of difficulty explaining particular activities and did not produce the explanations of motivation many had desired. For instance, what drive is reduced when a first-time skydiver pays $150 for the privilege of leaping headfirst out of a plane? Again, the search for an explanation of motivation's origins shifted, this time to the biological, cognitive, and clinical arenas.

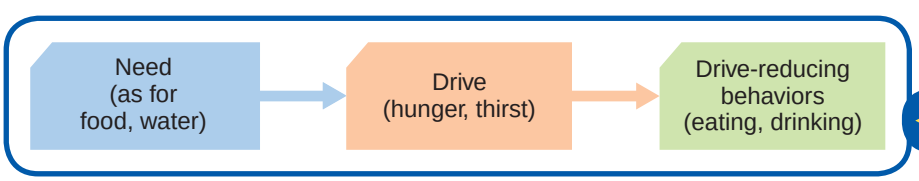


Figure 26.1
Drive-Reduction Theory

This theory states that need creates the tension (drive) necessary for you to be motivated enough to satisfy or reduce the need.

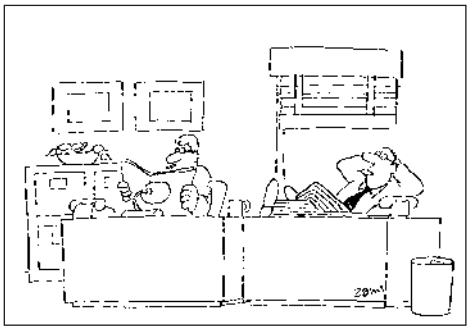
PAUSE NOW OR MOVE ON

Turn to page 476 to review and apply what you've learned.

Biological Explanations

WHAT'S THE POINT?

26-2 How do the concepts of optimum level of arousal and homeostasis apply to motivation?



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"What do you think . . . should we get started on that motivation research or not?"

Some psychologists believed that the key to understanding motivation would be found in biological processes other than instincts and drive reduction. One group searched for the answer in our level of psychological arousal, and another group looked closely at how we regulate our body chemistry.

Arousal Theories

It's Friday night, and you're sitting in a fast-food restaurant with three friends who have registered to take the same college entrance exam the next morning. You know that all three have about the same level of intelligence and knowledge base, but they seem to have different approaches to the test-taking process:

- *Friend A:* "You know, I don't really care about the test. I'm going to a trade school, and I'm only taking the test because my parents want me to. Can I have some of your fries?"
- *Friend B:* "I want to do well, but if I screw up on this test, it's not going to permanently ruin my life. I'll give it my best shot. Where's the ketchup?"
- *Friend C:* "It's all on the line tomorrow. If I don't get a good score, it will change my life forever. I'm so nervous, I can't eat."

Each of these three people has a different level of *arousal;* the brain of each has activated different levels of alertness. So, which of them will stand a better chance of acing the exam? One arousal theory, the Yerkes-Dodson law, would predict a better performance by Friend B. The **Yerkes-Dodson law** is the theory that a degree of psychological arousal helps performance, but only to a point. The optimum level of arousal depends on the difficulty of the task. Too much or too little arousal can decrease performance, as shown in **Figure 26.2.** Using this reasoning, Friend A's level of arousal would be too low to ace the exam and Friend C may be too overstimulated to do well.

Arousal theorists think that each of us has an optimal level of stimulation we like to maintain. When you're stressed out (overstimulated), how do you relax? If your optimal level of stimulation is low, perhaps you'll go for a quiet walk or talk casually with a friend. If your optimal stimulation level is high, you might crank up your favorite music or enjoy a vigorous workout. Arousal theorists explain the motivation behind our behaviors as our attempts to maintain this optimal level of stimulation. And this explanation, they would say, tells us why skydivers (who presumably have a high optimal stimulation level) pay good money to leap headfirst through half a mile of space!

Yerkes-Dodson law The theory that a degree of psychological arousal helps performance, but only to a point.

We are also biologically driven to learn. There are areas of the brain that make us feel good after we've learned something. We hunger for information once our biological needs are met (Biederman & Vessel, 2006). A similar idea is the basis of the next biological motivation theory, which focuses on maintaining a balanced internal state.

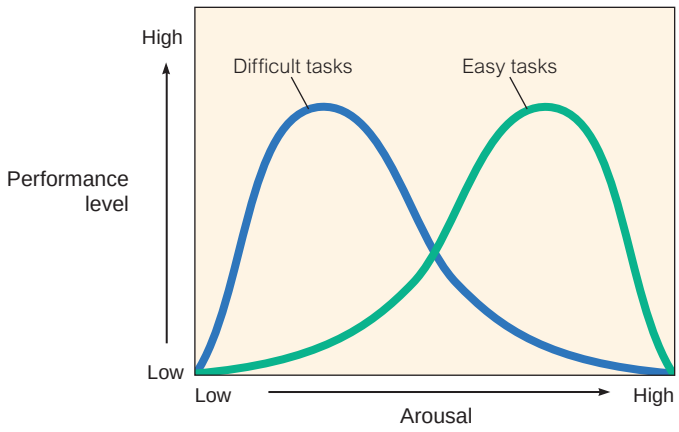


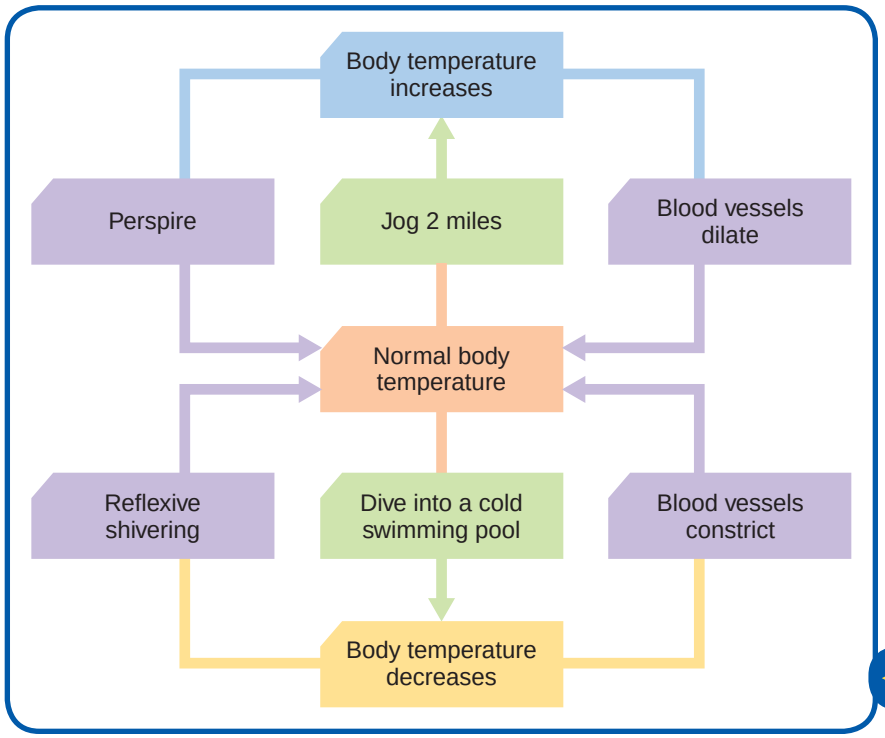
Figure 26.2
Arousal and Performance

The Yerkes-Dodson law describes the relationship between performance and arousal. In general, arousal will increase performance up to a point, after which further arousal impairs performance. However, optimal arousal changes according to the difficulty of the task. For a simple task, higher arousal leads to optimal performance. Lower arousal is best for difficult tasks. (From Hembree, 1988.)

Homeostasis

What is your average body temperature? Most of us maintain a fairly constant 98.6 degrees Fahrenheit. But if you ride a bike, jump rope, or play basketball, your temperature will rise until perspiration and other body mechanisms kick in to bring your temperature back down to normal. This return to normal is a product of **homeostasis,** the body's tendency to maintain a balanced or constant internal state. Balancing our internal states means regulating such things as hormone levels, water levels in our cells, and blood sugar level. Any change in the normal level, up or down, will be corrected, bringing us back to the comfort zone (see **Figure 26.3**). Is this concept limited to your body? How about the shopping mall? The thermostat there is set at a comfortable temperature, and if the temperature drops below that setting, the heat will come on. A rise in temperature will activate the air conditioner.

The concept of homeostasis sounds like drive-reduction theory, doesn't it? The difference lies in what each emphasizes. Remember



homeostasis A tendency to maintain a balanced or constant internal state.

Figure 26.3
An Example of Homeostatic Regulation

When body temperature increases or decreases, body mechanisms like those illustrated here kick into gear, returning your temperature to normal.

extrinsic motivation A desire to perform a behavior because of promised rewards or threats of punishment.

intrinsic motivation A desire to perform a behavior for its own sake and to be effective.

that drive-reduction theory focuses on *removing deficits*. Homeostatic regulation focuses on *avoiding both deficits and surpluses*.

The biological pieces to motivation's puzzle help us see parts of motivation's big picture. The cognitive pieces make the picture clearer.

PAUSE NOW OR MOVE ON

Turn to page 476 to review and apply what you've learned.

Cognitive Explanations

WHAT'S THE POINT?

26-3 Are we more motivated by external factors or by internal factors?

Cognitive theories examine the role thoughts play in motivating behavior. Let's look at one key example of a cognitive theory of motivation—the difference between extrinsic motivation and intrinsic motivation.

At any given time during the school year, you probably have at least one or two tests on the horizon. What motivates you to study for these tests? Is it because you want an A, or is it because you are excited about the material and want to learn as much as you can? If you're studying only to earn an A (or to avoid an F), psychologists would say that your motivation is extrinsic. **Extrinsic motivation** is the desire to perform a behavior because of promised rewards or threats of punishment. The desire to perform a behavior for its own sake, because it is interesting and fun to do (surely the reason you study for your psychology tests), is **intrinsic motivation.** So, if you work at a fast-food restaurant flipping burgers, are you working because you want the money or because you're trying to make the best burger possible? Is your motivation in this situation extrinsic or intrinsic? Only you know the answer.

Which is the better form of motivation: extrinsic or intrinsic? Will students learn how to design good web pages faster if they're promised external rewards, such as money for As in technology class, or if they're told they can post their site on the Internet as soon as they learn how to make suitable pages? Are the better teachers those who are "in it for the money" or those who love to teach? Research indicates that intrinsic motivation has an edge over extrinsic motivation, at least in some areas. For example, intrinsic motivation often results in high achievement, whereas extrinsic motivation does not (Spence & Helmreich, 1983). The most creative scientists, artists, teachers, actors, and writers are those working from intrinsic motivation (Amabile, 1996). Does this mean that those most exemplary in their field are oblivious to the extrinsic rewards of success? *No,* but rather than being the focus of their efforts, the money and fame seem more like a pleasant surprise.

SCOTT HALLERAN/GETTY IMAGES

Paid to Perform

This athlete is receiving an extrinsic reward for playing football. Would he likely play even harder if his rewards were intrinsic?

Intrinsic and extrinsic motivations surely work together for some of our activities. Sometimes, of course, external rewards can help us achieve a goal. The marching band kids who wash cars every summer weekend to pay for a trip to a New Year's Day parade are extrinsically motivated to earn some extra money.

A primary concern about external rewards, however, is that behaviors maintained by extrinsic motivation alone may not be effectively sustained once the rewards are removed. That is, will grades go down if a parent stops giving money rewards for anything above a C? Evidence suggests removal of an extrinsic motivator may result in behavior levels even lower than before the rewards were given (Lepper et al., 1973). And suddenly introducing external rewards can certainly disrupt the intrinsic pleasure found in certain activities. If your little sister loves to shoot baskets but you start giving her a piece of candy for every shot she puts in the hoop, she may start playing basketball for the candy instead of the pure joy of the activity (see Thinking About Positive Psychology: Learning to Lead).

Thinking About POSITIVE PSYCHOLOGY

Learning to Lead

To be an effective leader—with friends, with family, or on the job—you will have to know how to motivate others. Motivating others is a four-step process:

1. *Cultivate intrinsic motivation.* We know that intrinsic motivation produces greater achievement. You can cultivate intrinsic motivation by providing appropriately challenging tasks that foster curiosity. The other side of this coin is avoiding manipulative extrinsic rewards that control behavior ("I'll give you $10 for every A"). Extrinsic rewards can be effective if they *inform* ("Look at this great report card! Let's go out to dinner to celebrate!") rather than *control.* Praising effort more than ability also helps (Mueller & Dweck, 1998).
2. *Attend to individual motives.* Not everybody moves to the beat of the same drummer. If you know this, you will try to discover what motivates each individual in your group. You can challenge those who value *accomplishment* to achieve excellence in a variety of settings. You can pay extra attention to those who require *recognition.* And you can provide competitive opportunities for those who value *power.*
3. *Set specific, challenging goals.* Several studies show that setting specific, challenging goals motivates higher achievement (Locke & Latham, 1990; Mento et al., 1987; Tubbs, 1986). Clear objectives promote effort, direct attention, and stimulate creative strategies. Help others define their goals while providing consistent feedback on progress (Fishbach et al., 2006).
4. *Choose an appropriate leadership style.* Figuring out which leadership style is best for you or for the situation can be a challenge, but the results are worth it. Consider two general styles. Task leadership is goal oriented. Leaders using this style set standards, organize work, and focus attention on goals. Social leadership emphasizes group efforts, builds teamwork, resolves conflict, and offers support. Those working with social leaders may buy into the process, feeling more motivated to achieve if they are in on the decision making.

PAUSE NOW OR MOVE ON

Turn to page 477 to review and apply what you've learned.

THE GRANGER COLLECTION, NEW YORK/THE GRANGER COLLECTION

ABRAHAM MASLOW (1908–1970) Humanistic psychologist who proposed the hierarchy of needs, with self-actualization as one of the ultimate psychological needs.

Clinical Explanations

WHAT'S THE POINT?

26-4 How do Maslow's hierarchy of needs and Murray's achievement motivation theories describe motivation?

Clinical psychologists, those who assess and treat people with psychological disorders, have shed additional light on our understanding of motivation. Clinical explanations of motivation do not rely on physiological data. Rather, they base their conclusions on information clinicians have gathered in intensive studies of individuals (often patients) or groups. Here, we consider two clinical explanations of motivation: Abraham Maslow's famous hierarchy of needs and Henry Murray and David McClelland's views on achievement motivation.

Hierarchy of Needs

If you're sleepy, with your body craving a nap, you may not feel like reading *Lord of the Flies*. Similarly, if you're stranded on foot in an unfamiliar city late at night and concerned for your safety, you probably won't be thinking about your next date. Some of your needs are clearly more basic than others. The need for sleep will take precedence over the need to learn, just as the need for safety will take precedence over the need for companionship.

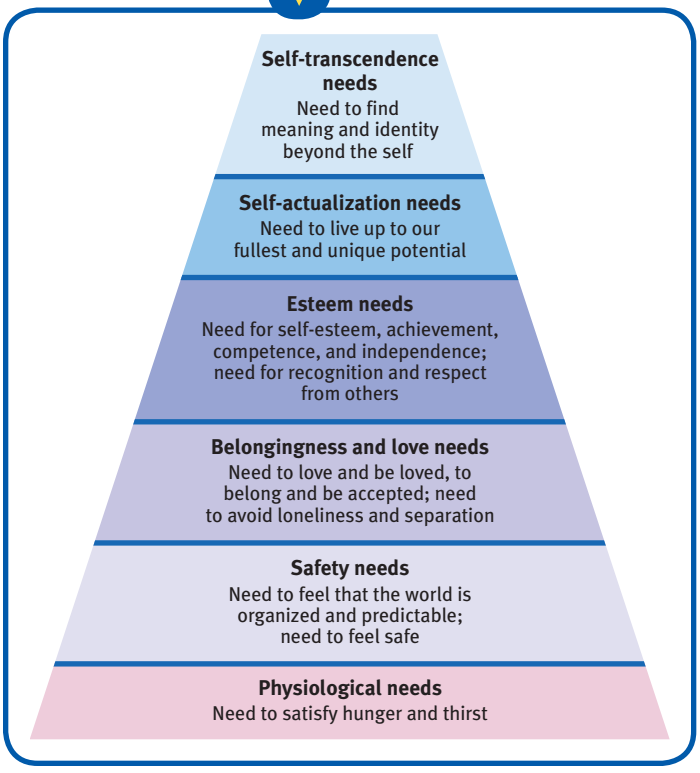
Recognizing that some needs take priority over others, **Abraham Maslow** (1970) designed his famous **hierarchy of needs** (see **Figure 26.4**). The idea behind this pyramid structure is that we must satisfy physiological needs (air, water, food, sleep) before safety needs and psychological needs can motivate us. One of the highest needs, according to Maslow, is **self-actualization,** the need to realize full and unique potential.

Maslow's hierarchy has been widely applied in business and industry. That is, if the need for self-esteem (fourth level up on the pyramid) includes working on important projects, then the wise employer should take steps to ensure that the social needs of the third level have already been met. The notion is that employees need to feel accepted before they are ready to work on projects that would bring self-esteem. Above the self-esteem level, people are said to realize their own potential by self-actualizing. And at the top of the pyramid, the self-transcendence level, people go beyond the self to strive for purpose and meaning (Koltko-Rivera, 2006).

The hierarchy of needs has been in nearly every introductory psychology textbook for 40 years, but we should be careful about putting too much

Figure 26.4
Abraham Maslow's Hierarchy of Needs

Maslow's theory proposes that we must satisfy our basic physiological needs before we can try to meet higher-level safety and psychological needs. (From Maslow, 1970.)


Self-transcendence needs
Need to find meaning and identity beyond the self
Self-actualization needs
Need to live up to our fullest and unique potential
Esteem needs
Need for self-esteem, achievement, competence, and independence; need for recognition and respect from others
Belongingness and love needs
Need to love and be loved, to belong and be accepted; need to avoid loneliness and separation
Safety needs
Need to feel that the world is organized and predictable; need to feel safe
Physiological needs
Need to satisfy hunger and thirst

AP PHOTO/CHARLES DHARAPAK

Salvatore Giunta

The heroic actions of Staff Sergeant Salvatore Giunta, the first living Medal of Honor winner since the Vietnam War, would not have been predicted by the hierarchy of needs.

hierarchy of needs Maslow's pyramid of human needs, beginning at the base with physiological needs that must be satisfied before higher-level safety needs and then psychological needs become active.

self-actualization According to Maslow, an ultimate psychological need that arises after basic physical and psychological needs are met and self-esteem is achieved; the motivation to realize our full and unique potential.

empirical stock in the theory, as critics have found fault with Maslow's research methods. His sample size was too small, he selected his own participants for study, and he defined his terms ambiguously. Moreover, many people behave in ways that don't conform to Maslow's hierarchy. For instance, how does the hierarchy account for the political prisoner who goes on a hunger strike, or the soldier in Afghanistan, like Medal of Honor winner Salvatore Giunta, who abandons the need for safety to satisfy the needs for national belongingness and esteem? The hierarchy of needs does not cover all situations.

Achievement Motivation

Clinical psychologists often find themselves treating people who struggle to succeed in life. Why do some succeed against all odds, whereas others fail despite having been given every opportunity? What motivates you to stay

Psychology in THE REAL WORLD

Motivating Ourselves

Who are your heroes? Do they hold public office, help keep our communities safe, or help you learn? Perhaps they're exceptionally good at running, acting, or singing. Somewhere along the line, our heroes and role models became motivated to succeed. Judging from their lives, their achievement motivation must be high. Did you ever wonder where such motivation to succeed comes from? Or whether you could increase your own level of motivation? If so, you'll be happy to know that the experts say, "Yes!" Here are three ways you can further develop your self-motivation:

1. *Associate your high achievement with positive emotions.* If you score high on a test, don't attribute it to luck. Celebrate! You did well because you are bright.
2. *Connect your achievement with your efforts.* A bad grade may simply mean you need to spend more time studying than you're used to. The best athletes and actors have had to work hard at their craft, even though they make it look effortless when we watch them perform.
3. *Raise your expectations.* Your goals should be high enough so that you are challenged, but not so unreasonably high that you become discouraged.

Figure 26.5
What's Going on Here?

Motivation researchers use people's responses to ambiguous photos like this to assess achievement motivation. They ask research participants to invent stories about the people in the photo, and then the researchers analyze the stories, watching for achievement themes.

LEWIS J. MERRIM/PHOTO RESEARCHERS, INC.

in high school when 20 percent of your peers across the country are dropping out of school? Why do some students persist in their quest for a college degree when so many give up after a year or two? And why do some camp out overnight in line to buy tickets to a concert you couldn't pay others to attend? The answer may partly be **achievement motivation** (see Psychology in the Real World: Motivating Ourselves). According to **Henry Murray** (1938), such motivation includes a desire for

- significant accomplishment.
- mastery of ideas, things, or people.
- attaining a high standard.

AP PHOTO

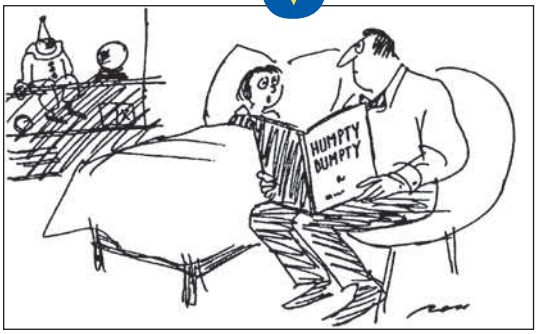
HENRY MURRAY (1893–1988) Neo-Freudian who first established the concept of achievement motivation and developed important personality testing tools.

Appreciating differences in achievement motivation is one thing; comparing those differences is quite another. Without physiological indicators, how might we measure achievement motivation? David McClelland (1953) and his colleagues devised a way. Look at the photo of the young man in **Figure 26.5.** If you had to write a story about what was going on in that photo, what would you say? McClelland assumed that people tell stories that reflect their own achievement motivation. So, if people told stories about heroic acts, pride in accomplishment, or pursuit of a goal, McClelland labeled them as having an achievement theme. And he gave people who consistently wrote stories with achievement themes high scores for achievement motivation.

People high in achievement motivation persist in the face of difficulty. Is it any surprise that a study of gifted artists, scholars, and athletes showed that all had impressive, self-disciplined motivation to meet their goals (Bloom, 1985)? What distinguishes these outstanding high achievers is not their raw talent. Rather, their daily practice regimen eclipses that of less-accomplished colleagues. Achievement is much more than ability: Those with a passion to perfect and the discipline to prepare are often the best in their fields. High achievers often display *grit,* which is described as passionate dedication to an ambitious goal. Evidence of grit, or self-discipline, in high school seniors better predicts which of them will succeed in college than grades, SAT or ACT scores, or graduation honors (Duckworth & Seligman, 2005). As my Grandpa Ledbetter used to say, "I think you'll get a lot luckier at baseball, Randy, if you practice a bit more!"

Storybook Achievers

The main character in children's stories often works hard to overcome obstacles. Does this theme help establish an expectation of achievement in children who hear these stories?



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"Maybe they didn't try hard enough."

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Motivate Yourself!

Celebrate those good grades or that healthy heart and know that your hard work is paying off. If your grades or your fitness aren't so great, don't write yourself off. Such feats take dedication and discipline. Setting reasonable daily and long-term goals will help.

Persisting despite difficulties brings rewards to the not-so-rich-and-famous, too: People who were underachievers in high school tend to have more difficulty later in life holding on to both a job and a spouse compared with their high-achieving counterparts (McCall, 1994).

achievement motivation A desire for significant accomplishment; for mastery of things, people, or ideas; and for attaining a high standard.

Now that you have a general understanding of how psychologists explain our motivational processes, let's look at a key motivator: hunger. Hunger has physiological components, but key psychological factors also contribute to our motivation to eat, as evidenced by the devastating effects of eating disorders.

PAUSE NOW OR MOVE ON

Turn to page 477 to review and apply what you've learned.

Hunger: A Closer Look

WHAT'S THE POINT?

26-5 What physiological factors and environmental factors control hunger?

Ever been asked to relate an embarrassing moment from your past? I don't have to think long to come up with several examples, one of which includes my first college date. It was Friday morning, the second week of college. The

PEANUTS

THE EARS HEAR THE CAN OPENER..
© 1989 United Feature Syndicate, Inc.
RIGHT AWAY THE STOMACH KNOWS THAT SUPPER IS COMING..
HOW DO THE EARS TELL THE STOMACH?
I'VE NEVER BEEN ABLE TO FIGURE THAT OUT..
5-17
SCHULZ

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plan was to meet at the snack bar after English class, where we could have a Coke and work through that early what-do-I-say awkwardness. If things progressed, perhaps a meal and movie would follow.

No sooner did we sit down than my stomach let out a growl so loud that people in both booths across from us turned quickly to look. In hopes of distracting my lovely companion, I started naming movies I'd like to see. But it happened again! Not quite as loud, perhaps, but twice the duration. These empty-stomach pangs, which I was powerless to control, did not make a good impression. I did go out for a meal and a movie that night, but it was with my not-as-lovely roommate, Chad.

Inopportune stomach rumblings are a fact of life and generally indicate hunger. However, other factors—some physiological, some environmental—also tell us when to eat.

Physiology of Hunger

For a physiological understanding of hunger, we turn first to some key substances in your body and then to your brain's control of these substances:

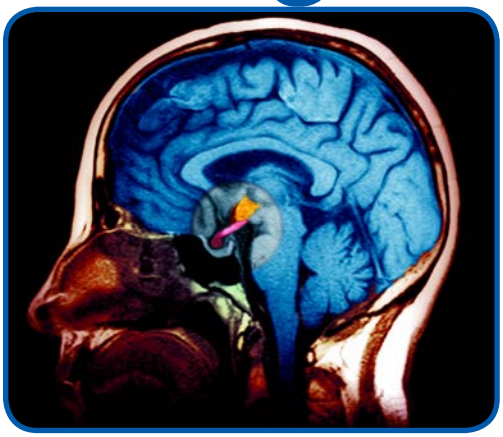
- *Glucose*—This form of sugar circulates throughout your body. Run low on glucose, and you will feel hungry. Glucose is a major source of energy for your body.
- *Insulin*—This hormone allows your cells to use glucose for energy or convert it to fat. When levels of insulin go up, glucose levels go down.
- *Leptin*—This protein is produced by bloated fat cells, which send out a "stop eating" message. Artificially increased leptin levels in mice stimulate activity and reduce eating. Obese mice receiving leptin injections lose weight (Halaas et al., 1995). The leptin receptors in obese humans may be insensitive to leptin, however (Considine et al., 1996), and studies are under way to determine whether some drug treatment might help activate those receptors.
- *Orexin*—This hunger-triggering hormone is produced by the hypothalamus. When glucose levels drop, orexin levels rise and we feel hungry.

What do all these substances have in common besides hunger? Your brain controls each substance in some way. Your *hypothalamus,* a key structure in your brain, actively regulates your appetite in many ways (see **Figure 26.6**). For example, the hypothalamus monitors leptin levels to estimate available fat. We've learned a lot from medical records of people who had tumors near the base of the brain (the location of the hypothalamus) and subsequently became overweight (Miller, 1995). We've also learned a lot from rats. Damage to parts of the hypothalamus that restrain eating will produce excessive eating in rats. Stimulate those areas instead, and a rat will starve to death.

Research studies involving rats have also indicated the importance of carbohydrates in your diet. These starchy foods help boost levels of the neurotransmitter *serotonin* in your brain, which helps calm you when stressed. Rats will eat more Oreo cookies (high in carbs) when stressed than when unstressed (Artiga et al., 2007).

Figure 26.6
The Hypothalamus

The hypothalamus (colored orange in this picture) contains important hunger controls. Depending on the information it receives through substances in your blood, your hypothalamus can send messages that encourage you to eat or stop eating.



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One interesting theory views the hypothalamus as a "weight thermostat." This thermostat is genetically engineered to maintain a **set point,** which is the weight a full-grown active person hovers around when not trying to gain or lose weight (Lissner et al., 1991). When a body falls below this set-point weight, increased hunger and a lowered metabolic rate may act to restore lost weight. (As a teen, your body doesn't yet have a set point because you're still growing and still gaining weight as a part of normal development.) Regardless of how much the person eats in a given day (and calorie intake does vary), the scale will pretty much register the same weight. Set-point theory relies on three underlying concepts:

1. We have a **basal metabolic rate,** the body's resting rate at which we burn calories for energy.
2. We start out with a specific number of fat cells, which can expand in size and increase in number.
3. We have hormones that work together to keep our weight where it's designed to be.

The metabolism of a normal-weight person who overeats will speed up, preventing weight gain. But an overweight person's metabolism reacts differently. When overweight people diet, their bodies react to the reduced intake of calories as if to starvation. Their metabolism slows down to conserve energy, converting more glucose to fat in preparation for the apparent "famine." Set-point theory may help explain why so many people who lose weight by dieting gain the weight back: They are returning to their set point.

JACKSON LABORATORIES

Hunger in the Brain

Damage to the part of the hypothalamus responsible for controlling eating leads to a threefold increase in weight in rats, providing evidence for the brain's control of hunger mechanisms.

Environment and Hunger

Certainly, our body chemistry and the thermostat-like action of the hypothalamus fuel our drive to eat. But physiology is not the only hunger catalyst. We should also consider external incentives and culture.

set point The point at which an individual's "weight thermostat" is supposedly set; when the body falls below this weight, an increase in hunger and a lowered metabolic rate may act to restore the lost weight.

basal metabolic rate The body's resting rate at which we burn calories for energy.

External Incentives The sight, sound, and smell of food—all external incentives—seem to affect some people more than others (whose eating habits appear to be triggered more by internal factors). This difference is so striking that researchers have labeled the first group "externals" and the

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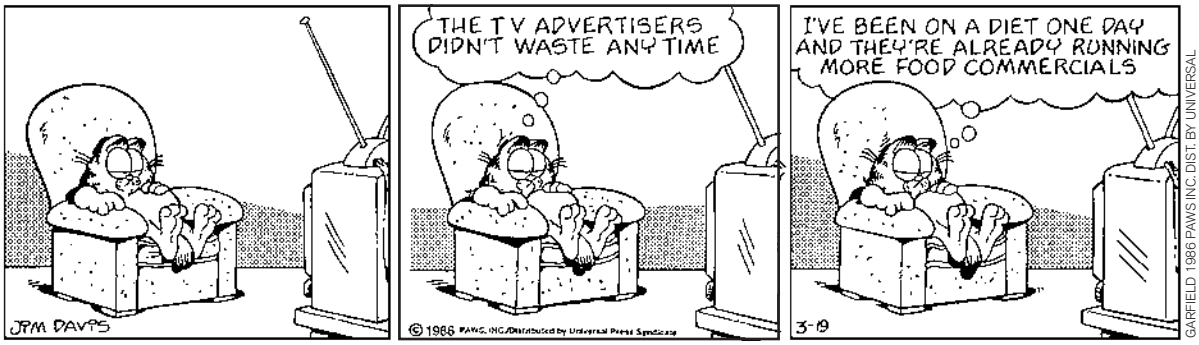
THE TV ADVERTISERS DIDN'T WASTE ANY TIME
I'VE BEEN ON A DIET ONE DAY AND THEY'RE ALREADY RUNNING MORE FOOD COMMERCIALS
JIM DAVIS
3-19

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other group "internals." In one study, researchers had internals and externals fast for 18 hours. They then took the two groups into a laboratory where steak was cooking. Compared with the internals, the externals experienced a greater increase in blood insulin levels in hopeful anticipation of incoming food energy (Rodin, 1984). External stimuli affect the hunger-related physiological states in many individuals.

Eating and Attitudes

Our culture affects what we eat, how much, and when.

WORLD RELIGIONS PHOTO LIBRARY/ALAMY

Culture Like external incentives, culture shapes our attitudes toward eating. White Americans often see obesity as a weakness or a sign of laziness. African-Americans and Latinos tend to be less concerned about weight and generally more accepting of those who are overweight (Crandall, 1988; Hebl & Heatherton, 1998). Culture also affects taste. We tend to shun foods to which we have not been exposed but not think twice about eating the familiar foods we've seen all our lives on the dinner table. I've never eaten horse, dog, or rat meat, but people in other parts of the world readily accept these foods and even prefer them to foods I consider a great treat, such as shrimp. Repeated exposure to new foods increases our willingness to give them a try (Pliner, 1982; Pliner et al., 1993).

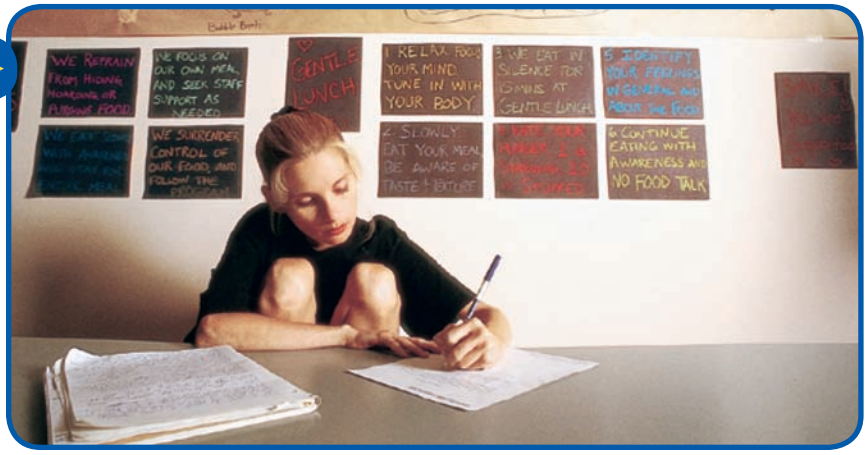
The situation in which we are eating also affects our appetite. For example, researchers have found that we consume more when eating with others than when eating alone (Hetherington et al., 2006).

Eating Disorders

A member of my daughter's ballet class looked like a normal 15-year-old at the beginning of the year—5 feet, 5 inches tall, and weighing 120 pounds. As the year went by, however, this young woman became increasingly thin, even as she continued to make remarks to other members of the class about how "fat" she was. Some wondered if she was ill. Obsessed with losing weight, she hit 90 pounds before finally undergoing treatment for

Recipe for Eating Disorders

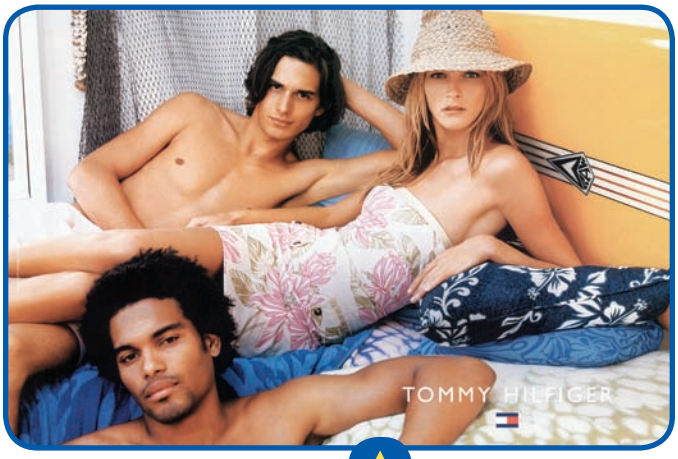
Excessive concern over weight may lead to anorexia nervosa or bulimia nervosa. This girl is in an inpatient treatment program for anorexia and writes in a journal to help her clarify the emotions that contribute to her disorder.



LARA JO REGAN/THE GAMMA LIAISON NETWORK/GETTY NEWS IMAGES

anorexia nervosa, an eating disorder in which a normal-weight person (9 times out of 10, an adolescent female) has a distorted self-perception of being overweight. People with anorexia put themselves on self-starvation regimens and become dangerously underweight (15 percent or more below normal).

Despite the attention the press has given to eating disorders lately, they aren't confined to the present time. Years ago, I remember hearing stories of how cheerleaders and drill-team members (all girls) at other schools had to "weigh in" every Monday morning as a means of monitoring weight. Rumors also flew that many of these girls were bulimic, which meant they had **bulimia nervosa,** an eating disorder characterized by overeating (usually high-calorie foods) followed by vomiting (purging), laxative use, fasting, or excessive exercise. Binge-purge eaters fear gaining weight, are preoccupied with food, and often suffer from depression, anxiety, or both (Hinz & Williamson, 1987). Individuals with anorexia often display bulimic characteristics as well.



THE ADVERTISING ARCHIVE

The Perfect Form?

Because pictures of what are considered perfect body types surround them, many people feel imperfect by comparison.

What causes these eating disorders? For some, there may be a genetic link. Twin studies show that identical twins are more likely to have the same eating disorder than fraternal twins are (Fichter & Noegel, 1990; Kaplan, 2004). From an evolutionary standpoint, it has been noted that our ancestors who survived famine were probably not the people who merely stayed put to wait it out. Likely, those who became overly active in their search for food survived, and the genes that were passed on to the next generation reflected the drive to find food and eat it (Guisinger, 2004).

Without question, however, the genetic factors interact with a cultural pressure to be thin. These pressures are particularly strong in weight-conscious cultures. Mothers who are unusually concerned about their own weight, and about the weight and appearance of their daughters, are more likely to have a child with an eating disorder (Pike & Rodin, 1991). Anorexia usually starts as a diet, and bulimia often has its origins in a diet broken by gorging. Furthermore, those who idealize thinness are more prone to eating disorders. These thinness worshipers, not surprisingly, are also more likely to have great dissatisfaction with the way their own body looks (Stice, 2002).

Our society bombards us with pictures of the "perfect" body in commercials and advertisements, an image unobtainable by nearly everyone. Our weight-obsessed culture worsens the situation, sending the message that fat equals weakness. Susan Wooley and Orland Wooley (1983, p. 884) sum up culture's effect: "An increasingly stringent cultural standard of thinness for women has been accompanied by a steadily increasing incidence of serious eating disorders in women." Fortunately, research suggests that interactive prevention programs focused on girls aged 15 and over work to help increase acceptance of body appearance (Stice et al., 2007).

● The noblest motive is the public good.

Virgil (70 B.C.–19 B.C.)

anorexia nervosa An eating disorder in which normal-weight people (usually adolescent females) have a distorted self-perception of being "fat," put themselves on self-starvation regimens, and become dangerously underweight (15 percent or more below normal).

bulimia nervosa An eating disorder characterized by episodes of overeating—usually of high-calorie foods—followed by vomiting, use of laxatives, fasting, or excessive exercise.

PAUSE NOW OR MOVE ON

Turn to page 477 to review and apply what you've learned.

The common thread running through these discussions of biological, cognitive, and clinical explanations is the notion of *motives*. The same thread that weaves its way through hunger and eating disorders continues through discussions of terrorism, leadership, and other motivated behaviors. Though hidden like the processor in a computer, motives energize and direct behavior, whether the goal is for good or bad. Understanding motives helps us predict and control all kinds of behaviors.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 26

Thinking About Motivation

Historical Explanations

WHAT'S THE POINT?

26-1 How did early psychologists explain human motivation, and what were the limitations of these theories?

- After William James's efforts to identify human instincts, other instinct theorists listed thousands of instincts to explain human motivation.
- Drive-reduction theorists thought that all human behaviors were motivated by physiological needs. We act to reduce these physiological needs.
- Both instinct theory and drive-reduction theory have difficulty explaining the motivations behind many specific examples of human behavior (such as risk taking).

Apply What You Know

1. True or False: The instinct theory of motivation became a less popular way to explain behavior because humans are not animals and do not have instincts.
2. Which motivation theory best fits this description of behavior: "When we are cold, we are motivated to stand next to the fire to warm up"?
   a. drive-reduction theory
   b. James's motivation theory
   c. instinct theory
   d. mental motivation theory

Biological Explanations

WHAT'S THE POINT?

26-2 How do the concepts of optimum level of arousal and homeostasis to apply to motivation?

- Arousal theory predicts that everyone has an optimum level of arousal.
- We are also motivated to maintain a balanced internal physiological state (homeostasis).

Apply What You Know

3. What is the major difference between drive-reduction theory and homeostasis theory?
   a. Homeostasis is an older theory than drive-reduction theory.
   b. Drive-reduction theory describes instincts, while homeostasis describes mostly drives.
   c. Drive-reduction theory focuses on removing deficits, but homeostasis focuses on avoiding both deficits and surpluses.
   d. Drive-reduction theory is mostly environmental, and homeostasis is biological.
4. Optimal level of arousal for peak performance is supported by the _____.

Cognitive Explanations

WHAT'S THE POINT?

26-3 Are we more motivated by external factors or by internal factors?

- Intrinsic motivation is associated with higher achievement levels.
- Introducing extrinsic motivators can reduce intrinsic motivation, and behaviors motivated by extrinsic factors are not sustained if the extrinsic motivator is removed.

Apply What You Know

5. Grades are an example of
   a. an intrinsic motivator.
   b. an instinct motivator.
   c. a drive motivator.
   d. an extrinsic motivator.
6. True or False: Extrinsic rewards are associated with higher achievement but also cause higher stress levels than intrinsic motivators.

Clinical Explanations

WHAT'S THE POINT?

26-4 How do Maslow's hierarchy of needs and Murray's achievement motivation theory describe motivation?

- Abraham Maslow's hierarchy of needs explains that humans are motivated to achieve the next level on a hierarchy that begins with physiological needs and ends with higher-level needs such as self-actualization and self-transcendence.
- Henry Murray's achievement motivation theory states that humans are motivated by desires for significant accomplishment, mastery, and attaining high standards.

Apply What You Know

7. Which of the following behaviors would Abraham Maslow's hierarchy of needs have the most trouble explaining?
   a. risking physical harm by protesting for civil rights
   b. stealing a loaf of bread
   c. working on a difficult school project to increase self-esteem
   d. voluntarily taking a difficult college course
8. Henry Murray and the achievement motivation theorists found that high-achieving artists, scholars, and athletes often had greater _____ than people who didn't achieve as much.

Hunger: A Closer Look

WHAT'S THE POINT?

26-5 What physiological factors and environmental factors control hunger?

- The hypothalamus in the brain controls levels of sugar, hormones, and proteins in the body to regulate hunger.
- The brain works to maintain a set point—a target weight—through metabolic rate, expansion or contraction of the number of fat cells, and hormone levels.
- Culture affects our attitudes toward body size and different kinds of foods.
- Eating disorders like anorexia nervosa and bulimia nervosa both involve preoccupations with body weight and dangerous eating habits.

Apply What You Know

9. Which of the following factors best explains why people who lose weight on a diet often gain it back eventually?
   a. bulimia nervosa
   b. set point
   c. instinct
   d. hierarchy of needs
10. A person who says, "It doesn't matter if I'm hungry or not; if the food looks good, I'm going to eat it" would probably be categorized as
    a. an internal.
    b. an external.
    c. bulimic.
    d. self-actualized.

KEY TERMS AND KEY PEOPLE

motivation, p. 462
instinct, p. 462
drive-reduction theory, p. 463
Yerkes-Dodson law, p. 464
homeostasis, p. 465
extrinsic motivation, p. 466
intrinsic motivation, p. 466
hierarchy of needs, p. 468
self-actualization, p. 468
achievement motivation, p. 470
set point, p. 473
basal metabolic rate, p. 473
anorexia nervosa, p. 475
bulimia nervosa, p. 475
Abraham Maslow (1908–1970), p. 468
Henry Murray (1893–1988), p. 470

MODULE 27

Emotion

Theories of Emotion
- Historical Approaches
- Cognition and Emotion

Fear: A Closer Look

The Expression of Emotion
- Nonverbal Communication
- Gender and Cultural Effects on Emotion

Whether we feel happy, sad, or fearful, emotions play a big part in our lives.

Every school year, I see lists of names posted by the theater, band room, athletic office, and other locations around the school. Have you ever searched a list looking for your name? The cast list for a play? The honor roll? An election? Chair placements in the band? Did your name appear where you'd hoped—or where you'd feared? Perhaps it was left off altogether.

Having posted a few lists myself for student council elections, I've witnessed students jumping and screaming with happiness, excitement, and surprise. I've seen others, clearly disappointed and with tears in their eyes, force a smile and walk bravely away. Still others did little to disguise their anger.

Did You Make It?

The student on the left saw her name on the cast list for the new play. The two students on the right did not. All are experiencing emotion.

SPENCER GRANT/PHOTOEDIT, INC.

emotions Whole-organism responses, involving physiological arousal, expressive behaviors, and conscious experience.

The **emotions** these students were having were full-body responses, involving physical arousal, expressive behaviors, and conscious experiences. Let's see how this might work. Imagine that you and a good friend check the National Honor Society list to see whether either of you has been chosen. A smile breaks across your friend's face as she sees her name. She pumps her fist above her head and gives a little whoop of joy. Then, checking the list again, she notices your name is missing. Reining in her emotions, she starts providing explanations, such as "I was lucky to have made it" or "Maybe your name was left off by mistake." Her shift from personal happiness to shared sadness with you contains the three ingredients of emotion:

- *Physiological activation*—Increased heart rate as she reads the good news; decreased heart rate as she consoles you.
- *Expressive behaviors*—Smiling and pumping her fist after seeing her name; losing the smile and putting an arm around your shoulder when she notices your name is missing.
- *Conscious experience*—Interpreting what it means to be selected as a member; understanding what it means to you to be left out.

Which Comes First?

Is it the physiological arousal or the emotional experience? This issue has been widely debated in psychology.

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"I don't sing because I am happy. I am happy because I sing."

Compared with other species, from dolphins to deer to ducks, humans appear to be the most emotional (Hebb, 1980). This rich source of human behavior has intrigued psychologists for more than a century and has sparked some emotional debates. Those debates revolve around two controversies, both addressing the order in which each ingredient is stirred into the recipe for emotions:

1. Which comes first, physiological arousal or the subjective experience of an emotion? Do you feel happy because your heart is pounding, or is your heart pounding because you feel happy?
2. Can we react emotionally before appraising a situation, or does thinking always precede emotion? Did you feel joy at seeing your name on the list before you thought about what that meant, or did you interpret the situation and then feel joy?

To answer these questions, psychologists have been proposing theories and designing experiments to test them for more than a hundred years.

Theories of Emotion

James-Lange theory The theory that we experience emotion because we are aware of our bodily response to an emotion-arousing stimulus.

WHAT'S THE POINT?

27-1 How do historical approaches to emotion differ from modern theories of emotion?

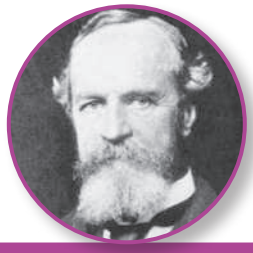
As is often the case when several perspectives exist on a given topic, the theories of emotion are complementary: Each theory of emotion provides some insight into why or how we experience emotions.

Historical Approaches

Ask the person with the locker next to yours why she is smiling, and she might say, "Because I'm happy." Why did you slam your locker door? "Because I'm angry." Why are you trembling? "Because I'm afraid." Common sense explains any of these emotions as a result of a *stimulus*. For instance, a fire alarm might lead to a conscious feeling (fear) and a physiological response (shaking, increased heart rate). In other words, using fear as the example, the fire alarm sounds, you experience fear, and your heart starts to race. Early theories on emotion do not agree with this commonsense approach.

In the 1890s, psychologist **William James** and physiologist **Carl Lange** both proposed theories that challenged the commonsense sequence of emotions. The **James-Lange theory** says that we experience emotion because we are aware of our bodily response to an emotion-producing stimulus. So, the fire alarm sounds, you start shaking, you become aware of the shaking, and then you label this reaction as fear.

Walter Cannon (James's son-in-law) disagreed with the James-Lange view of emotion. Cannon (1929) noted that the heart races whether we're frightened, angry, or exhilarated. How, then, can the same physiological reaction trigger such different emotional interpretations? And how do we explain circumstances where we have such reactions without any emotion-provoking stimuli?



SCIENCE PHOTO LIBRARY/PHOTO RESEARCHERS, INC.

WILLIAM JAMES (1842–1910) Psychologist who believed our awareness of physiological responses leads to our experience of emotion (see *James-Lange theory*).

THE ROYAL LIBRARY, DENMARK

CARL LANGE (1834–1900) Danish physiologist who proposed a theory of emotion similar to, and at about the same time as, James's theory that awareness of physiological responses leads to experiences of emotion (see *James-Lange theory*).

FOTOSEARCH/GETTY IMAGES

WALTER CANNON (1871–1945) American physiologist who, with Philip Bard, concluded that physiological arousal and emotional experience occur simultaneously (see *Cannon-Bard theory*).

Cannon-Bard theory The theory that an emotion-arousing stimulus simultaneously triggers physiological responses and the subjective experience of emotion.

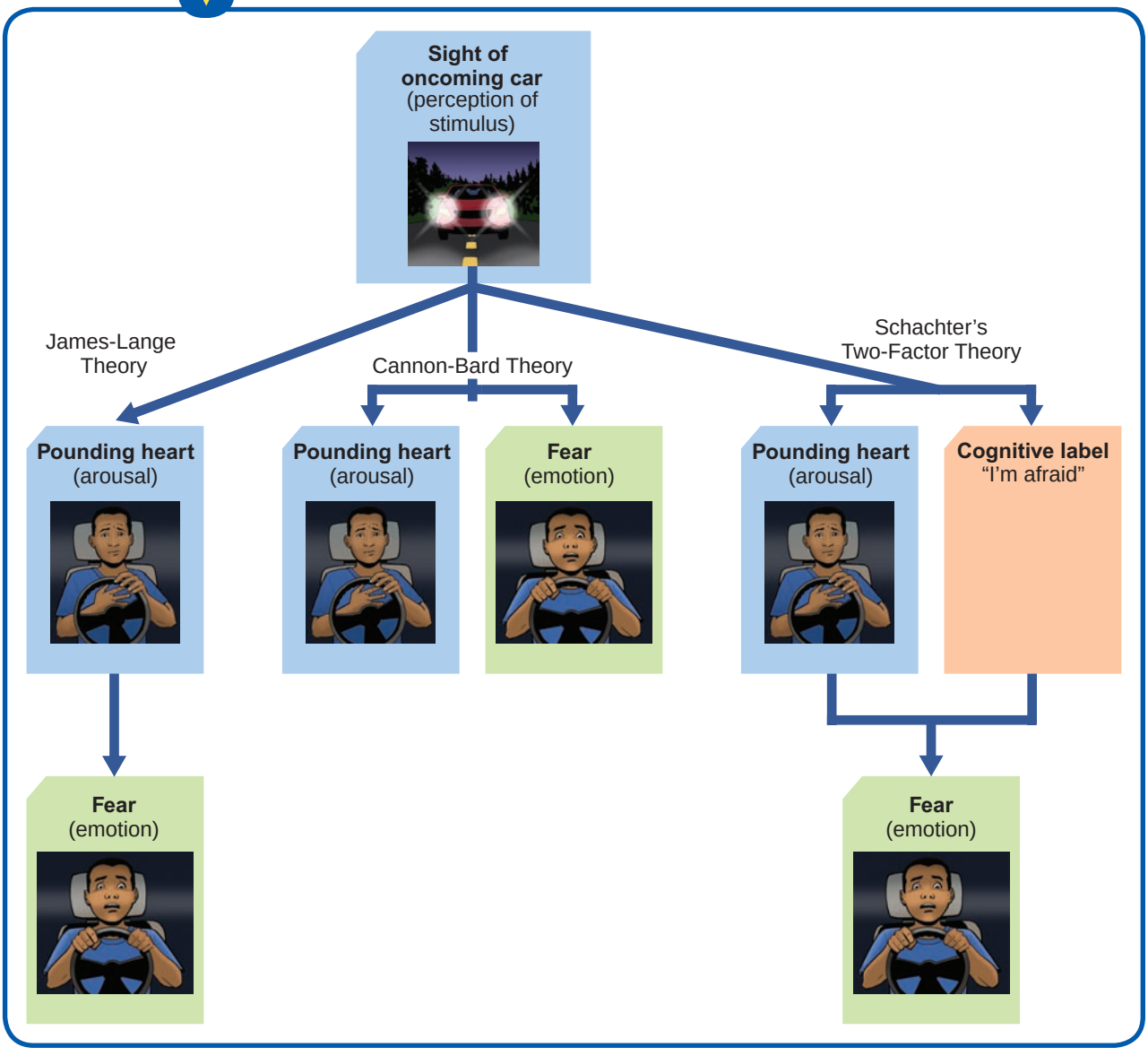
two-factor theory The theory that to experience emotion we must be physically aroused and must cognitively label the arousal.

Chopping onions, for example, produces the bodily response usually associated with sadness, but chopping onions does not cause sadness. After elaboration by Philip Bard (1934), this view became known as the **Cannon-Bard theory** of emotion. It proposed that an emotion-arousing stimulus *simultaneously triggers* physiological responses and the subjective experience of emotions.

Each of these older psychophysiological theories helps us understand emotion. We do feel emotions, to some degree, by observing changes in our bodies, as the James-Lange theory maintains. But the Cannon-Bard theory was also correct in asserting the important role that the brain and the nervous system play in our conscious feelings (see **Figure 27.1**). Modern psychophysiological explanations tie the importance of hormone levels to emotions. Higher levels of testosterone, for example, are linked to aggression. But does aggression cause testosterone levels to increase, do higher levels of testosterone cause aggression, or does some third factor cause both of them? To answer such questions, psychologists have examined the way our thoughts influence our emotions.

Figure 27.1
Three Theories of Emotion

These theories have different views on why we experience emotion.



Cognition and Emotion

Which comes first—our thoughts about a situation (our *cognitive appraisal*) or our experience of the emotion? This chicken-and-egg dilemma characterizes the second of the two controversies in the study of emotion. Let's look at some contemporary cognitive approaches to emotion: the two-factor theory and two different theories that attempt to explain the sequence of events in emotions.

Stanley Schachter (pronounced SHACK-ter) and Jerome Singer (1962) developed one of the leading cognitive theories of emotion. Their **two-factor theory** of emotion proposes that to experience emotion we must be physically aroused and must cognitively identify the arousal. The first factor, *physiological arousal,* can be brought about by anything from a loud stimulus to a drug. The second factor is a *cognitive label* of the physiological arousal. The bottom line to this theory is that we distinguish emotions by how we label the arousal we feel. If you're aroused and you believe the appropriate emotion is fear, then you'll feel afraid. If you think anger is the appropriate emotion, then you'll instead explain your arousal as anger. According to two-factor theorists, our physical experiences of emotions are so similar that we must cognitively appraise and label our reactions to experience an emotion.

Do all cognitive psychologists agree with this viewpoint? Certainly not. **Robert Zajonc** (pronounced ZI-yence) (1984) argued that emotion and cognition are separate. Zajonc also suggested that our interpretations of situations are sometimes slower than our emotional reactions. In other words, before we know what we think about a situation, we know how we feel about it.

Complex research supports Zajonc's argument. We have pathways in our brain that carry or transmit messages from one part of our nervous system to another. Certain pathways skip the cortical (thinking) parts of the brain and take a more direct path to the amygdala, an emotion control center in the brain (see **Figure 27.2**). Some researchers, such as Joseph LeDoux and Jorge Armony (1999), believe these shortcuts explain why our feelings are more

STANLEY SCHACHTER [SHACK-ter] (1922–1997)
American psychologist who, with Jerome Singer, concluded that emotion requires a cognitive label of physiological arousal (see *two-factor theory*).

COLUMBIA UNIVERSITY

ROBERT ZAJONC [ZI-yence] (1923–2008)
American psychologist who concluded that some emotional reactions involve no deliberate thinking; he believed that cognition is not always necessary for emotion.

STANFORD NEWS SERVICE

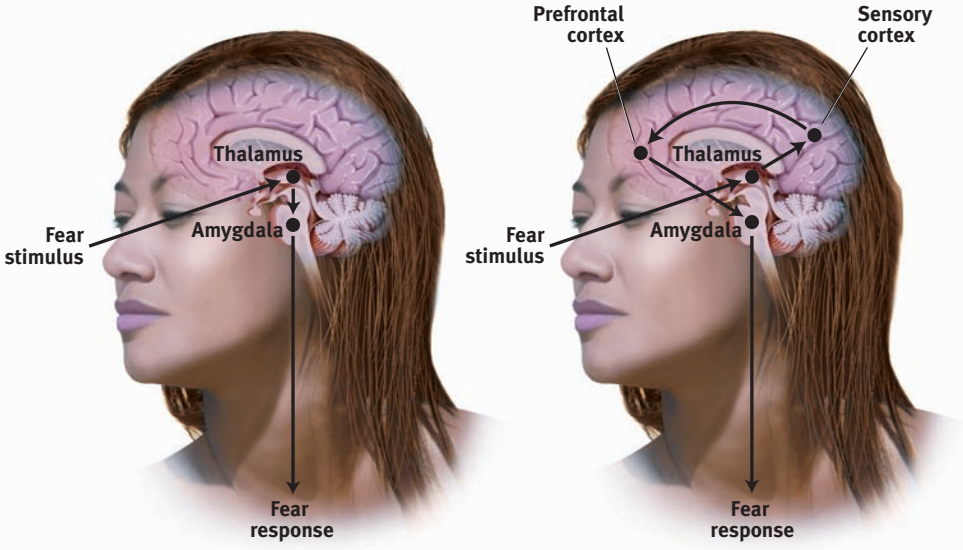


Figure 27.2
First Run, Then Think!

Your brain has shortcuts that allow you to react almost instantly to a frightening situation instead of thinking about what you should do and why you should do it.

likely to control our thoughts than our thoughts are to control our feelings, particularly when we're surprised. For example, imagine that you are raking leaves on a fall afternoon. You notice some leaves rustling, and you jump back, not knowing whether the rustling was caused by the wind or by a snake in the grass. After your immediate fear response, the thinking part of your brain takes over, and you take steps to determine whether danger is present ("It's a snake! Run!").

Zajonc believed that emotions are basic to human existence and that they developed before cognition in the history of our species. For these reasons, cognition need not always take place prior to emotion. Of course, not all emotion researchers agree with Zajonc.

SAXON DONNELLY

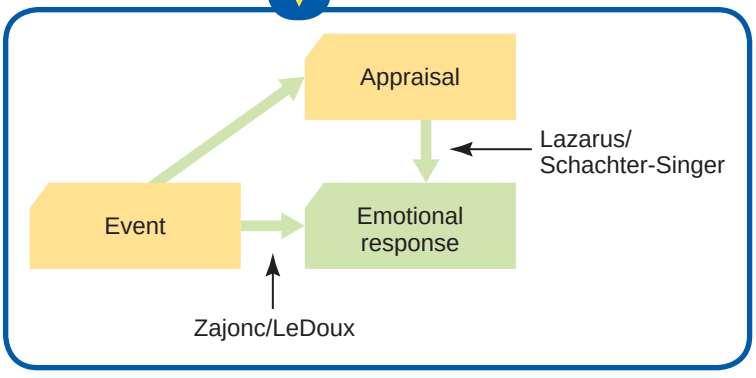
RICHARD LAZARUS (1922–2002) American psychologist who concluded that some emotional responses do not require conscious thought but still involve some kind of unconscious cognitive appraisal.

Richard Lazarus (1991, 1998) agreed that our brains can process information outside our *conscious* awareness and that some emotional responses do not require conscious thought. However, Lazarus contended that there must be at least a minimal amount of *unconscious* thinking, even for emotions we feel instantaneously. How else would we know what we're reacting to? The initial appraisal of the rustling leaves produces the emotion of fear and an accompanying jump away, based on a snap assessment that the situation may be harmful. A secondary, conscious appraisal involves deciding what to do after the immediate, initial response.

In brief, Schachter, Singer, and Lazarus would maintain that complex feelings like love or moods like depression are profoundly influenced by expectation, interpretations, and memory. Zajonc and LeDoux's research suggests that simple dislikes and likes, as well as fears, need not involve conscious thought (see **Figure 27.3**). Changes in our thinking will likely not affect these latter emotional responses.

Figure 27.3
Two Paths to Emotional Responses

According to Robert Zajonc, some emotional responses are immediate and do not require conscious appraisal. However, for Richard Lazarus and Stanley Schachter, emotional responses are also determined by the appraisal and labeling of events.



Most of the emotions we face daily are much more complex than a primitive fear of snakes, and they require more sophisticated cognitive appraisals. Being the first one in your family *not* to make the National Honor Society might produce immediate disappointment that, after further analysis, leads to the complex emotion of shame. A note of consolation from a friend who did make it can produce a slow, warming feeling of happiness if you choose to see the effort as heartfelt and if you have a history of warm exchanges with that friend. Our more complex emotions, such as love, happiness, shame, and guilt, are rooted in our conscious interpretations, appraisals, and memories of earlier experiences. *How* we think about situations also affects these emotions. Thinking positively about situations makes us feel better; thinking negatively makes us feel worse. Barbara Fredrickson's "broaden-and-build" theory of emotion evaluates the differences between thinking positively and negatively (2009). See Thinking About Positive Psychology: Broadening and Building Better Health Through Positive Emotion for a closer look at this groundbreaking work on what positive emotions do for us.

Although there are competing theories about our understanding of emotion, there is little debate about how your body reacts to certain emotions, such as fear. It's time to take an in-depth look at what we know about fear.

Thinking About POSITIVE PSYCHOLOGY

Broadening and Building Better Health Through Positive Emotion

The study of emotion has intrigued psychologists for over a hundred years, and the work of psychologist Barbara Fredrickson and others brings that endeavor into the twenty-first century. Fredrickson has proposed the broaden-and-build theory of positive emotions (2001, 2006a; Fredrickson et al., 2008). Existing theories deal with how emotions prepare us psychologically and physically to act. That is, if we see a snake, we feel afraid, and we escape. If we get angry, we have the urge to fight. What Fredrickson rightly points out is that positive emotions have never fit very well into these existing frameworks.

Enter the broaden-and-build theory. Fredrickson's research has shown that just like negative emotions (for example, fear), positive emotions are also important for survival, but in different and more advanced ways. "Positive emotions expand cognition, behavioral tendencies, and increase your options when it comes to using your resources" (2009).

Put more simply, experiencing positive emotions increases our intellectual, physical, social, and psychological resources (see **Figure 27.4**).

Fredrickson's research involves inducing negative, positive, or neutral emotions in her research participants. What she has found is that in additional to reporting greater happiness, those who experience positive emotions get along better with others, learn nearly all coursework more easily, overcome problems faster, spend less time absent due to illness, have better relationships, make more friends, and volunteer to help others more often than those experiencing negative or neutral emotion. Fredrickson calls this "broadening and building your mindset." She contends that negative emotions tend to do the opposite by closing us down and making us less likely to increase our resources.

Fredrickson (2009) suggests that we can maximize the benefits of positive emotions by

1. working at ways to remember times when we felt safe, relaxed, and joyful.
2. sincerely expressing gratitude, thanks, and appreciation to those who have helped us.
3. keeping track of when we have felt optimistic, hopeful, and encouraged by the possibility of a good outcome.
4. logging what makes us laugh or amuses us.

Seeking that which inspires us increases positive emotion, as does savoring a bright orange sunset, a favorite poem, or a beautiful song. However, we must make the choice to seek the sunset, read the poem, or play the song in order to tap into this positive emotion that can broaden and build our mindset. Fredrickson's research indicates that consciously choosing the "upward spiral" of increasing positive emotions will lead to our best future, and ultimately to a better world.

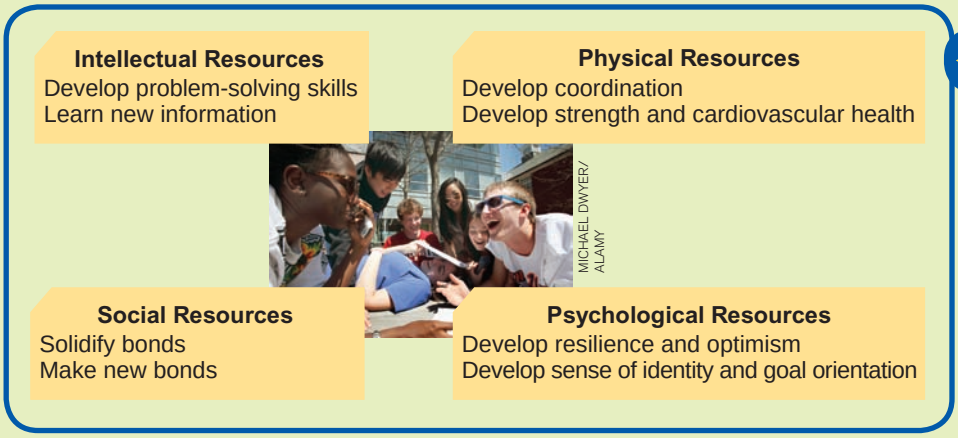


Figure 27.4
Broaden and Build

Research shows that experiencing positive emotions increases our intellectual, physical, social, and psychological resources. (From Fredrickson, 2006b.)

PAUSE NOW OR MOVE ON
Turn to page 492 to review and apply what you've learned.

Fear: A Closer Look

WHAT'S THE POINT?

27-2 What physiological changes occur during a fear reaction, and what parts of the nervous system are involved in the changes?

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Sympathetic Nervous System Arousal?

Evidently, this man is not a fighter.

Your body undergoes changes as you experience emotions like fear. Some are obvious: A fire alarm goes off, and your stomach seems to turn inside out, your muscles tense, and your mouth may even go dry. But your body is also busy in other not-so-obvious ways, preparing you for this alarming situation. Your blood is flowing from organs with momentarily nonessential functions and coursing toward other body parts you may need in this emergency. For instance, your digestion slows, but bloodflow increases to the muscles you'd need to run away. Your pupils dilate, or increase in size, allowing more light into your eyes and improving your vision. Your liver dumps sugar into your bloodstream for energy, and perspiration appears to cool your churned-up body. All these involuntary activities underscore your body's incredible and wonderful response to a dangerous situation. Perhaps most wondrous of all, you did not have to think about or consciously activate this system of defenses.

Your response to dangerous situations is coordinated by a two-pronged arrangement called your **autonomic nervous system (ANS),** the part of the nervous system that controls the glands and the muscles of the internal organs. Your autonomic nervous system has two divisions: one that arouses and one that calms (see **Figure 27.5**). The arousing side, the *sympathetic division,* accelerates your heart rate, increases respiration (breathing level), and increases the secretion of hormones that help prepare your body for fight or flight. The calming side, the *parasympathetic division,* slows your breathing, heart rate, and secretion of stress hormones (see **Figure 27.6**).

autonomic [aw-tuh-NAHM-ik] nervous system The division of the peripheral nervous system that controls the glands and muscles of the internal organs; its subdivisions are the sympathetic (arousing) division and the parasympathetic (calming) division.

Measuring ANS responses to questions is sometimes used in a misguided effort to detect whether someone is telling the truth (see Psychology in the Real World: Detecting Lies).

In addition to ANS activity, your brain has structures, such as the amygdala, that appear to play a key role in associating certain situations with fear (Reijmers et al., 2007). Individuals with damaged amygdala have shown decreased fear in situations where they should have been fearful (Schacter, 1996).

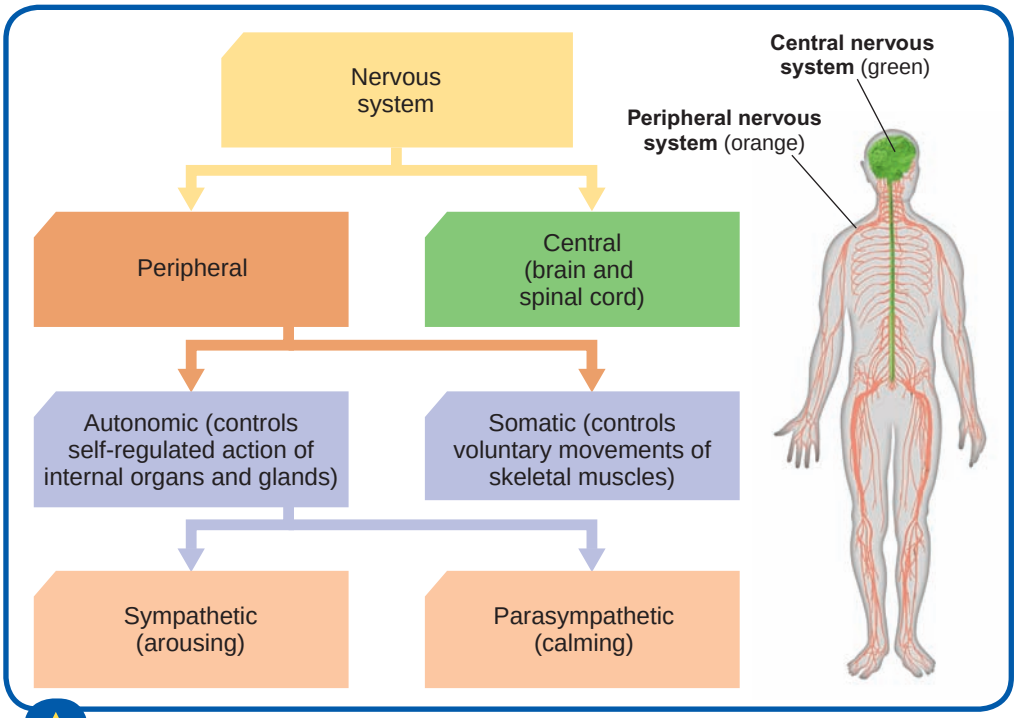

Nervous system
Peripheral
Central (brain and spinal cord)
Autonomic (controls self-regulated action of internal organs and glands)
Somatic (controls voluntary movements of skeletal muscles)
Sympathetic (arousing)
Parasympathetic (calming)
Central nervous system (green)
Peripheral nervous system (orange)

Figure 27.5
The Main Divisions of the Human Nervous System

Your nervous system has two main divisions (peripheral and central). Your body's reaction to fear is best explained using the autonomic branch of the peripheral nervous system.

Figure 27.6
Autonomic Nervous System and Physiological Arousal

The sympathetic (left) and the parasympathetic (right) branches of the autonomic nervous system (ANS) work to keep your body in balance. If one branch arouses or activates a system, the other starts to calm or inhibit the same system.

Sympathetic division (arousing)		Parasympathetic division (calming)
Pupils dilate	EYES	Pupils contract
Decreases	SALIVATION	Increases
Perspires	SKIN	Dries
Increases	RESPIRATION	Decreases
Accelerates	HEART	Slows
Inhibits	DIGESTION	Activates
Secrete stress hormones	ADRENAL GLANDS	Decrease secretion of stress hormones

PAUSE NOW OR MOVE ON

Turn to page 493 to review and apply what you've learned.

Psychology in THE REAL WORLD

Detecting Lies

Even though our brains are skilled at detecting emotions, we have a hard time detecting facial expressions that give away liars (Porter & ten Brinke, 2008). Still, we want to know who is telling the truth and who isn't, especially when a crime has been committed. News reports often provide details of crime suspects agreeing or refusing to take a polygraph or lie-detector test. Would you agree to take a lie-detector test if you were wrongly accused of committing a crime? Most of us answer this question with a resounding, "Of course!" After all, if we're not guilty, what do we have to hide, right? Well, it's not quite that simple. Careful review of the research on polygraphs may cause you to rethink your answer.

A polygraph machine monitors changes in heart rate, respiration, and perspiration to determine whether a person is feeling emotional stress about a particular question. The underlying assumption is that a person will show stronger autonomic nervous system (ANS) responses when lying than when telling the truth.

Unfortunately, polygraphs measure *all* stress reactions, including those from honest people who are upset by a question and not lying in their answer. Controlled studies of polygraph interpretations have produced some disturbing results. In one study (Kleinmuntz & Szucko, 1984), professional polygraph interpreters judged 37 percent of the innocent people they tested guilty. In the same study, these experts correctly identified the guilty parties only 76 percent of the time, meaning nearly one-fourth of the real liars fooled the

A Typical Polygraph Setup

Research casts doubt on this machine's ability to reliably predict those who tell the truth and those who don't.

STOCK CONNECTION BLUE/ALAMY IMAGES

The Expression of Emotion

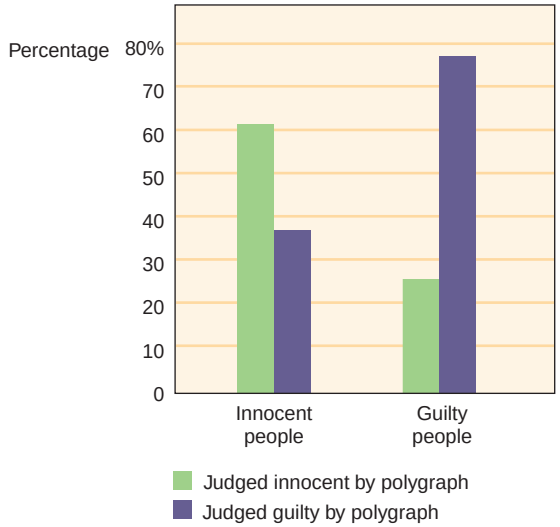
WHAT'S THE POINT?

27-3 How do gender and culture affect the ability to express and interpret nonverbal communications of emotion?

Researchers have been able to study emotional response through a variety of physiological measures. However, these results cannot tell us everything. If we measure the heart rate, breathing, and perspiration levels of people watching either a scary, anger-provoking, or sexually arousing movie, we can't tell by looking at the data who's afraid, mad, or aroused. The biological signatures of different emotions appear to be similar (Barrett, 2006). But if we look deeper than a beating heart and sweat—that is, if we measure brain

Figure 27.7
How Accurate?

One research study (Kleinmuntz & Szucko, 1984) showed that expert interpretations of polygraph tests judged more than one-third of the innocent people taking the tests to be guilty. In addition, almost one-fourth of the guilty were judged innocent by the test.



machine (see **Figure 27.7**). Hundreds of other studies on the validity of polygraph tests yield similar results (Ben-Shakhar & Furedy, 1990).

A more effective polygraph test asks questions about details that would be known only by those committing the crime (Bashore & Rapp, 1993). Even this test, however, relies on the same underlying assumption: Strong ANS responses indicate lying. This means that we must exercise extreme caution in how we use polygraph test results.

Researchers today are going deeper than the skin's surface. Much deeper. Are different parts of the brain activated when someone tells a lie? The answer appears to be *Yes*. The EEG (electroencephalograph) recordings and fMRI (functional MRI) brain scans of liars show very different activity compared to those telling the truth (Langleben et al., 2006). Millions of dollars are being spent on this technology to assess its appropriate uses by law enforcement agencies (Dingfelder, 2007). Look for brain activity measures as a way to help convict the guilty (while protecting the innocent) in the near future.

activity—we do see differences. Research has shown that different emotions activate different parts of the brain while using different brain circuits (Panksepp, 2007). Emotions like fear and anger appear to register on the right side of the brain, for example, while enthusiastic people typically show more activity on the left side (Drake & Myers, 2006).

Measuring physiological changes through the use of sophisticated electronic equipment is not the only means of recognizing emotions, however. We communicate emotions all the time without saying a word.

Nonverbal Communication

Has this ever happened to you? A teacher calls on you to answer a question, and you kind-of-sort-of know the answer. While you stumble your way through your reply, your teacher stops nodding in agreement, turns with arms crossed and brow furrowed, and looks at the floor. Meanwhile, the student

RICHARD LORD/PHOTOEDIT, INC.

Reading Between the Lines

Research shows that women are better than men at reading nonverbal emotional cues.

next to you shoots her arm up in the air, apparently ready to answer after you're through trying. Both your classmate and the teacher clearly communicated their feelings, even though they said nothing. You knew exactly what they were thinking because they communicated with you *nonverbally*.

Nonverbal communication, or *body language,* is a frequent messenger of our emotions to others. Our facial expressions, tone of voice, and hand gestures often give us away. We tend to look at a person's mouth to detect happiness but at the eyes for anger and fear. When we talk about someone "wearing his heart on his sleeve," we mean that person readily communicates emotions nonverbally. With either a quickly averted glance or an extended gaze, we can communicate everything from submission to dominance, disinterest to intimacy (Kleinke, 1986).

How we communicate and interpret emotions seems to depend on whether we are male or female and on what our culture has taught us about appropriate public behavior.

Gender and Cultural Effects on Emotion

Who is better at reading the nonverbal emotions we express: men or women? Studies regularly give the nod to women (Hall, 1987). Women show better skills at detecting emotion in people's facial expressions, body movements, and tone of voice (Blum, 1998). But both males and females find it more difficult to read the body language of the opposite sex than to read the body language of people of their own gender (Buck, 1984).

Men and women also differ in the way they express emotions (see **Figure 27.8**). North American women smile more, gesture with more expression, and have more expressive faces than their male counterparts (DePaulo et al., 1992; Kring & Gordon, 1998). Women also tend to talk more about their emotions (Grossman & Wood, 1993). North American men, on the other hand, seem to express only one emotion—anger—more openly than women (Coats & Feldman, 1996).

How can we explain these differences? As males and females, are we simply physiologically different or do we learn to behave differently? Research seems to indicate that at least two factors affect the way we learn to express and interpret emotions:

- *Power* is the first factor in interpreting nonverbal communications. In any relationship, from boss-employee to teacher-student, one person always has more power than the other. The person with *less* power will be more motivated to read the nonverbal emotional cues, and will probably read them better, than the person in charge (Fiske, 1993). In one study, Sara Snodgrass (1992) randomly assigned males and females to be either the leader or the follower in two-person teams. She found the followers were more sensitive than the leaders to nonverbal signals regardless of whether the leader was male or female.

- *Culture* is the second factor in interpreting nonverbal communication. People raised in expressive families, or in cultures that value being emotionally expressive, are likely to be more expressive regardless of whether they are male or female (Kring & Gordon, 1998).

Culture also influences how we express emotions and how we interpret the emotions of others. Consider the meeting in 1991 between American Secretary of State James Baker and Iraqi Foreign Minister Tariq Aziz. Saddam Hussein, Iraq's president at the time, had sent Aziz, his half brother, to represent him at this meeting, which followed Iraq's invasion of Kuwait (Triandis, 1994). Baker told Aziz, "If you do not move out of Kuwait, we will attack you." The message was clear and direct, and Baker's body language was calm and subdued. Aziz reported to his brother that Baker was "not at all angry. The Americans are just talking and they will not attack." He misread Baker's nonverbal communication, and thousands died in the war that followed.

What went wrong at this meeting? Baker delivered his message with the restraint customary for an American diplomat. Hussein's brother viewed the communication through the cultural window of his Iraqi heritage, which expects expression to be more emotional. To him, a truly angry person would gesture, shout, and stomp his foot. Neither Baker nor Aziz was aware of the **display rules** for the other's country, the cultural rules governing how and when a person may express emotion (Ekman et al., 1987).

Even the display rules for something as simple as when it's appropriate to smile can vary from one culture to the next. Germans, who smile less often than Americans, often think Americans are hiding their true feelings behind false smiles. Japanese observers of American behavior might disagree, stating that Americans don't smile often enough. In Japan, it is rude to display disappointment or distrust publicly, so the Japanese smile even more than Americans (Hall & Hall, 1990).

Cultures also disagree about the meaning behind gestures. Former presidents Richard Nixon and George H. W. Bush both got themselves in hot water by giving the "OK" sign in countries where this gesture is considered vulgar. The hand sign given by University of Texas football fans (index and pinkie fingers up, two middle fingers down) would seriously insult a man in Italy, where that gesture means his wife has been unfaithful.

And what about facial expressions? Are they read differently across cultures? Several studies (Ekman, 1994; Ekman & Friesen, 1975; Izard, 1977, 1994) have attempted to find the answer by showing photographs of different facial expressions to people around the world and asking participants to guess the emotion. How would you do on such a test? Take a minute or two to see if you can label the emotions in the facial expressions in **Figure 27.9.**

How did you do? Chances are, regardless of your cultural background, you did fairly well. Researchers have found that certain basic expressions and the

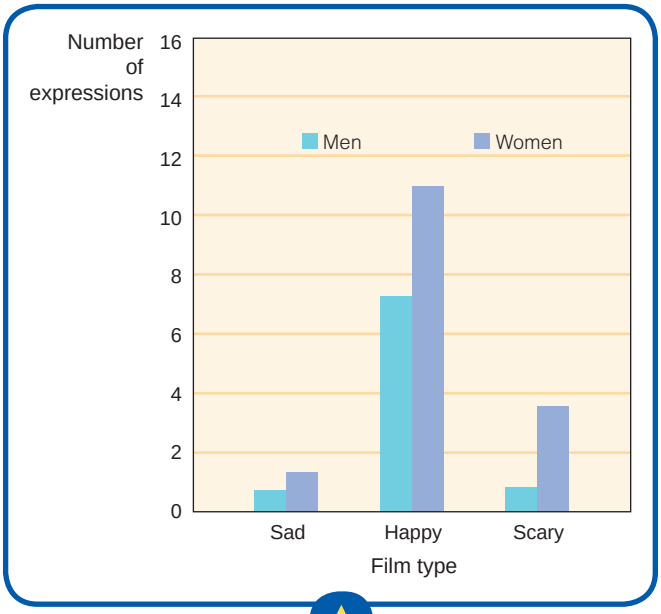


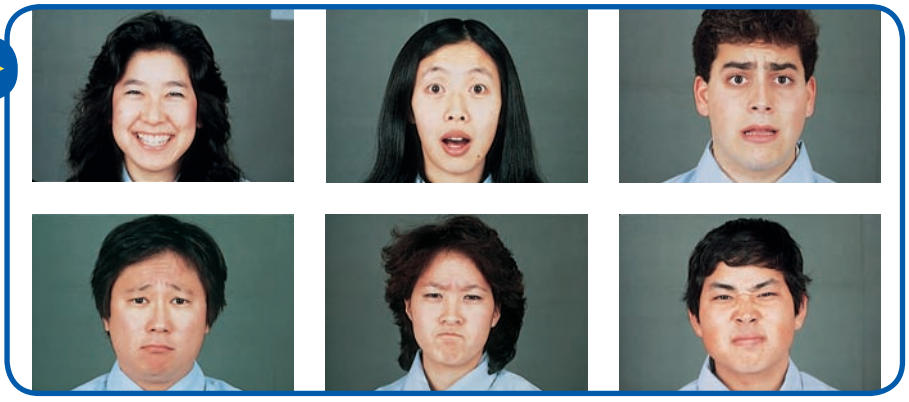
Figure 27.8
Females and Males Express Emotions Differently

Although females and males report about the same amount of experienced emotion, females *show* more emotion while watching emotional films. (From Kring & Gordon, 1998.)

display rules The cultural rules governing how and when a person may express emotion.

Figure 27.9
Facial Expressions and Culture

Are facial expressions culturally specific or culturally universal? Can you tell which face shows surprise? Happiness? Sadness? Fear? Disgust? Anger? Find the answers below. (From Matsumoto & Ekman, 1989.)



ALL PHOTOS: EKMAN & MATSUMOTO, JAPANESE AND CAUCASIAN FACIAL EXPRESSIONS OF EMOTION

● Answers to the questions in Figure 27.9: From left to right and top to bottom, the emotions displayed in these photos are happiness, surprise, fear, sadness, anger, and disgust.

display rules governing how to read them rise above culture (Matsumoto et al., 2008). Physiological measures of emotion also show consistency across cultures. As in many other areas of study in psychology, we see that although there are significant cultural and gender differences, there is a core of similarity among all humanity across the globe.

PAUSE NOW OR MOVE ON

Turn to page 493 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 27
Thinking About Emotion

Theories of Emotion

WHAT'S THE POINT?

27-1 How do historical approaches to emotion differ from modern theories of emotion?

- According to the James-Lange theory, we experience emotion because we are aware of our bodily response to an emotion-producing stimulus.
- The Cannon-Bard theory of emotion proposed that an emotion-arousing stimulus simultaneously triggers physiological responses and subjective experience of emotions.
- Schachter's two-factor theory proposes that the experience of emotion is produced by a combination of physical arousal and how we cognitively identify the arousal.
- Zajonc's brain research indicates that our interpretations (cognitive labels) sometimes come after our emotional experience.
- Lazarus agrees with Zajonc that some emotional responses do not require conscious thought but argues that emotional responses are influenced by unconscious thinking.

Apply What You Know

1. How we experience emotion is a combination of the emotion we think we're experiencing and the biological changes happening in our body. What theory was just described?

2. Because research indicated that some emotional responses did not require conscious thought, Richard Lazarus concluded that
   a. biological responses happen and we are only aware of them later.
   b. emotional responses are produced by a combination of consciously labeling them and biological responses.
   c. cognition strongly influences how we respond emotionally.
   d. we must interpret events unconsciously and react emotionally.

Fear: A Closer Look

WHAT'S THE POINT?

27-2 What physiological changes occur during a fear reaction, and what parts of the nervous system are involved in the changes?

- The sympathetic division of the autonomic nervous system is activated during a fear response, accelerating heart rate, increasing respiration, and increasing hormone levels that help prepare the body for fight or flight.
- The parasympathetic division of the autonomic nervous system slows the body after the fear response is finished.

Apply What You Know

3. Which of the two parts of the nervous system are most involved in the fight-or-flight response?
   a. central nervous system and parasympathetic nervous system
   b. autonomic nervous system and frontal lobe
   c. sympathetic nervous system and autonomic nervous system
   d. the two factors of two-factor theory: heart rate and respiration
4. What are some of the physiological responses involved in a fear reaction?

The Expression of Emotion

WHAT'S THE POINT?

27-3 How do gender and culture affect the ability to express and interpret nonverbal communications of emotion?

- Research indicates that women are better at understanding nonverbal expressions of emotions and that North American women are more expressive nonverbally than men. Both males and females have a more difficult time understanding nonverbal cues from the opposite sex.
- Power and culture affect how people express and interpret the emotions of others.
- Display rules, rules governing how and when a person displays emotion, differ between cultures.
- Facial expressions for basic emotions are consistent across cultures.

Apply What You Know

5. True or False: You learn in a class that women have historically had less power in many relationships in society. This historical fact may help explain why men are more expressive nonverbally than women are.
6. The _____ rules of a culture might most affect how a person behaves when angry.

KEY TERMS AND KEY PEOPLE

emotions, p. 480
James-Lange theory, p. 481
Cannon-Bard theory, p. 482
two-factor theory, p. 483
autonomic [aw-tuh-NAHM-ik] nervous system, p. 486
display rules, p. 491
William James (1842–1910), p. 481
Carl Lange (1834–1900), p. 481
Walter Cannon (1871–1945), p. 481
Stanley Schachter [SHACK-ter] (1922–1997), p. 483
Robert Zajonc [ZI-yence] (1923–2008), p. 483
Richard Lazarus (1922–2002), p. 484

Personality

MODULES

28 Psychodynamic and Humanistic Perspectives on Personality

29 Trait and Social-Cognitive Perspectives on Personality

In the hit teen movie *Mean Girls,* Rachel McAdams plays Regina George, a high school "queen bee" who appears to take on several personalities. She is at her nicest when talking to a football player at a party, but rude to and demanding of her mother. She is complimentary to a classmate about her "vintage" clothing, only to turn to a friend afterward to say, "That is the ugliest . . . skirt I have ever seen." Which of these personalities represents the true Regina George?

Psychologists study personality from many directions. Developmental psychologists study personality across the life span. Biological psychologists look for nature's influence on personality. Health psychologists research the effect of personality on well-being.

The next two modules explore personality from four different directions. In Module 28, we look at Sigmund Freud's psychoanalytic theory and its emphasis on unconscious motives. Then we show how this approach contrasts with the humanist perspective and its focus on self-fulfillment. In Module 29, we show how trait theorists search for the factors that make up personality. The final perspective we consider in that module is the social-cognitive approach, in which researchers investigate the influence of environmental factors and thought processes on personality.

MODULE 28

Psychodynamic and Humanistic Perspectives on Personality

Can we predict or explain a person's personality based on his or her description of an inkblot? Some psychologists think so. Let's see how psychologists try to understand personality.

What is personality? I hear students use this word all the time. Meredith likes how Corey looks but admits sadly, "It's true; he doesn't have much of a personality." And for those who do have personality, they have been labeled everything from "rotten" to "winning." These everyday notions of personality are fine for discussing friends between classes or at lunch, but psychologists use the term more carefully.

Psychologists define **personality** as an individual's characteristic pattern of thinking, feeling, and acting. In this module, we consider the psychodynamic and humanistic perspectives, two different viewpoints on how personality develops and how it can be assessed.

The Psychodynamic Perspective on Personality

- Freud's View of the Mind
- The Id, Ego, and Superego
- Defense Mechanisms
- Freud's Psychosexual Stages
- The Neo-Freudians
- Assessing Personality From a Psychodynamic Perspective
- Evaluating the Psychodynamic Perspective

The Humanistic Perspective on Personality

- Abraham Maslow and Self-Actualization
- Carl Rogers and the Person-Centered Approach
- Assessing Personality and the Self From a Humanistic Perspective
- Evaluating the Humanistic Perspective

personality An individual's characteristic pattern of thinking, feeling, and acting.

psychoanalysis Freud's theory of personality; also, a therapeutic technique that attempts to provide insight into thoughts and actions by exposing and interpreting the underlying unconscious motives and conflicts.

psychodynamic perspective A view of personality that retains some aspects of Freudian theory (such as the importance of unconscious thought processes) but is less likely to see unresolved childhood conflicts as a source of personality development.

The Psychodynamic Perspective on Personality

WHAT'S THE POINT?

28-1 How does the psychodynamic perspective explain personality?

After going out for three months and then breaking up, Tyler says, "I know I'm in *denial,* but I think we'll get back together." Mei refuses to talk about a past relationship, saying she doesn't remember much about it. "I've *repressed* that whole thing." In a class full of ill-mannered students, the teacher might say, "You've all *regressed* to eighth grade." These three commonly used terms—*denial, repression,* and *regression*—can all be traced back to **Sigmund Freud,** an Austrian physician who proposed psychology's first and most famous theory of personality. Freud believed that an individual's personality—the person's characteristic thoughts and behaviors—emerges from tensions generated by unconscious motives and unresolved childhood conflicts (many of them sexual). To uncover these conflicts and help patients resolve them, Freud used an approach he called **psychoanalysis,** a therapeutic technique that attempts to provide insight into thoughts and actions by exposing and interpreting the underlying unconscious motives and conflicts. Over the last three-quarters of the twentieth century, a more moderate **psychodynamic perspective** on personality emerged. The contemporary psychodynamic perspective incorporates some aspects of Freudian theory (such as the importance of unconscious thought processes), but psychodynamic therapists are less likely than Freud was to see unresolved childhood conflicts as a source of personality development.

Yet because of Freud's continuing popularity in pop psychology, you are more likely to be familiar with Freud's outdated terminology than with almost any other set of terms we introduce in this book. Freudian theory's popularity and controversial nature has led to hundreds of jokes in magazines and newspapers, several of which you'll see in this module. Let's outline Freud's original ideas so that you know how the buzz got started.

KEYSTONE PICTURES USA/ALAMY

SIGMUND FREUD (1856–1939) Founder of psychoanalysis, a controversial theory about the workings of the unconscious mind.

Freud's Office

Freud wanted his patients to relax in a reclining position, facing away from him, while he conducted his version of psychotherapy.

MARY EVANS/SIGMUND FREUD COPYRIGHTS

Freud's View of the Mind

Freud's theory of psychoanalysis grew from his early observations that some of his patients had problems that didn't seem to have a clear physical cause. Freud became intrigued by a neurologist in France who was treating patients using hypnosis. (Hypnosis is a social interaction in which one person—the hypnotist—makes forceful suggestions to another person that certain events or responses will occur.) Freud was amazed to find that some

patients' physical symptoms disappeared after the hypnotic experience.

Freud experimented with hypnosis, but he found that some patients could not be hypnotized. As an alternative to hypnosis, Freud asked his patients to relax and say whatever came to mind, regardless of how trivial or embarrassing the statement seemed. Freud viewed this technique, which he called **free association,** as a window into the unconscious mind.

Freud compared the human mind to a big iceberg consisting of three regions: the conscious, preconscious, and unconscious (see **Figure 28.1**). Just as most of an iceberg is below sea level and unseen, Freud felt that most of the mind is hidden from view. The *conscious* mind, the thoughts and feelings we're aware of, is comparable to the visible part of the iceberg above sea level. Just below the water line is the **preconscious,** a region of the mind holding information that is not conscious but is retrievable into conscious awareness. Finally, at the deepest level is the **unconscious,** a region of the mind holding mostly unacceptable thoughts, wishes, feelings, and memories. If he could help patients open the door to this unconscious region, Freud believed, they could recover painful childhood memories and healing could occur. (For a different take on icebergs, take a look at Thinking About Positive Psychology: Arriving Late and Hitting an Iceberg.)

According to Freud, treating someone with a psychological disorder meant delving into their unconscious, revealing the nature of that person's inner conflicts, and releasing tensions. Through free association and dream analysis, Freud tried to catch glimpses of the unconscious. He also searched for evidence in people's habits and in their slips of the tongue. These "Freudian

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Not Much Help!

Cartoonists have joked about Freud's methods for decades.

free association A method of exploring the unconscious in which the person relaxes and says whatever comes to mind, no matter how trivial or embarrassing.

preconscious According to Freud, a region of the mind holding information that is not conscious but is retrievable into conscious awareness.

unconscious According to Freud, a region of the mind that is a reservoir of mostly unacceptable thoughts, wishes, feelings, and memories.

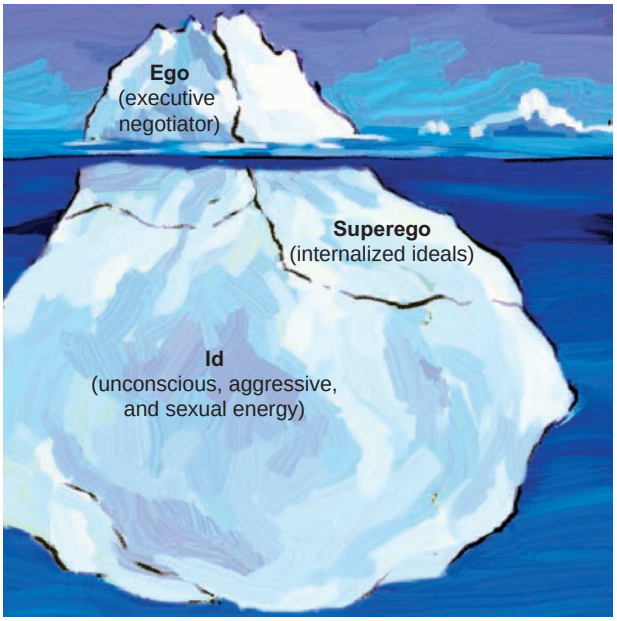


Figure 28.1
The Mind According to Freud

Freud thought only a small part of the mind or personality, the thoughts and feelings we attend to, was "visible." Freud represented the part of the mind we're aware of using a "tip of the iceberg" comparison. (Adapted from Freud, 1933, p. 111.)

slips," as they are often called today, are supposed to reflect what people would *like* to say. Freud illustrated this concept with an example of a money-strapped patient who did not want any large pills: "Please do not give me any bills, because I cannot swallow them."

Freud's view of personality also had three parts. All three fit into the iceberg: the id, the superego, and the ego.

Thinking About POSITIVE PSYCHOLOGY

Arriving Late and Hitting an Iceberg

You decide to see a movie with your friend Chris.

The plan: Leave from Chris's place an hour before the show, grab a burger, park near the theater, and get good, tenth-row-center seats. However, you end up running late because of a flat tire. You text Chris 30 minutes before the show: "Flat tire, on my way." Driving up, you jump out of the car and race to the house. As you ring the doorbell, an angry, red-faced Chris opens the door and yells, "You're always late. You always make me late. Just—forget it," and then slams the door. The depth of Chris's anger surprises you. What's going on?

Chris likely had an "iceberg belief" along the lines of "You should respect others enough not to keep them waiting." Icebergs are defined as deeply embedded assumptions about how the world should operate; they are beliefs or core values about ourselves and others (Reivich, 2010). Given Chris's iceberg belief, he felt disrespected.

Sigmund Freud used the iceberg metaphor (see Figure 28.1) to illustrate parts of the personality that can't easily be seen—that exist beneath surface level. Today's psychologists are more likely to talk about icebergs in the context of **resilience** than the id and the ego.

Psychologists often refer to resilience as the ability to grow and thrive in the face of challenges, or in other words, to bounce back from adversity (Reivich et al., 2005). Ever notice how some people recover quickly after a bad event, like missing a penalty kick in soccer, getting dumped, or being made late for a movie? These folks are more resilient than others. Unfortunately, not everybody is naturally resilient. The good news is that everyone can learn the skills that foster resiliency.

One of these skills is "detecting icebergs." Here are some examples of iceberg beliefs:

- I am smart.
- All people should be treated equally.
- Teachers should grade all students fairly.
- You should respect others enough not to keep them waiting.

Resiliency experts explain that these deep values and beliefs often drive our emotions and reactions to adversity. When your reaction seems out of proportion to the problem and begins to undermine your performance or effectiveness, you may have an iceberg that needs re-examining. Is this iceberg belief useful and accurate, or is it actually keeping you from seeing helpful information?

Chris's iceberg was about respect. Because he thought you disrespected him by being late, he blew up. His anger kept him from hearing about the flat tire. A more resilient thought would have been, "Yes, I'm upset. I might miss the movie, but there must be a good reason why my friend is late."

Iceberg beliefs can be useful or misleading. When you suspect that your reaction to a problem is stronger than it should be, stop to think about it. Ask yourself if there is an iceberg belief driving your reaction and whether that iceberg is useful and promotes accurate thinking. If it's not useful, be flexible enough in your thinking to seek alternative explanations of the adversity that are outside the iceberg (Reivich, 2009). You just might save yourself a lot of grief.

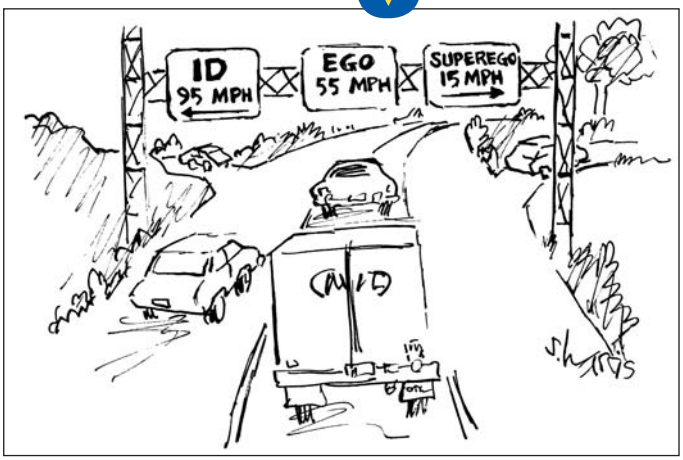
resilience The ability to grow and thrive in the face of challenges and to bounce back from adversity.

The Id, Ego, and Superego

Freud believed that personality grows out of a basic human conflict. Each of us is born with aggressive, pleasure-seeking biological impulses. But we live in a society, and—as we grow up—we internalize social roadblocks that restrain these impulses. The way each of us resolves the conflict between social restraints and pleasure-seeking impulses shapes our individual personality. Three forces interact during this conflict:

Id, Ego, and Superego

Which speed limit sign represents immaturity? Which represents too much caution?



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- The **id,** present at birth, consists of unconscious psychic energy and strives to satisfy basic sexual and aggressive drives. Operating from the *pleasure principle,* the id demands immediate gratification. For instance, a newborn cries for whatever it needs, whenever it needs it, regardless of what anybody else wants or needs.
- The **superego** consists of the internalized ideals and provides standards for judgment (the conscience) and for future aspirations. The superego develops as the child interacts with parents, peers, and society. It is the voice of conscience that focuses on what we *should* do, not what we'd like to do. The superego wants perfection, and those with a weak superego are likely to give in to their urges and impulses without regard to rules. On the other hand, an overly strong superego often produces someone who is virtuous yet guilt ridden.
- The **ego** is the largely conscious, "executive" part of the personality that negotiates among the demands of the id, the superego, and reality. The ego makes decisions after listening to both the demands of the id and the restraining rules of the superego. Operating from the *reality principle,* the ego satisfies the id's desires in ways that will realistically bring pleasure rather than pain. The ego, Freud thought, represented good sense and reason.

Freud believed that the id, ego, and superego could help us understand the mind. Freud thought that a healthy personality is one that could successfully express pleasure-seeking impulses while avoiding punishment or guilt. This task is not an easy one, however, and to achieve it, the ego must sometimes resort to defensive tactics.

id The part of personality that, according to Freud, consists of unconscious, psychic energy and strives to satisfy basic sexual and aggressive drives; operates on the pleasure principle, demanding immediate gratification.

superego The part of personality that, according to Freud, represents internalized ideals and provides standards for judgment (the conscience) and for future aspirations.

ego The largely conscious, "executive" part of personality that, according to Freud, negotiates among the demands of the id, the superego, and reality; operates on the reality principle, satisfying the id's desires in ways that will realistically bring pleasure rather than pain.

defense mechanisms In psychoanalytic theory, the ego's protective methods of reducing anxiety by unconsciously distorting reality.

Defense Mechanisms

Anxiety, wrote Freud, is the price we pay for living in a civilized society. The conflict between the id's wishes and the superego's social rules produces this anxiety. However, the ego has an arsenal of unconscious **defense mechanisms,** protective methods of reducing anxiety by unconsciously distorting

reality. You have probably heard of several of these defense mechanisms. We consider seven (see **Table 28.1**):

1. *Repression* banishes anxiety-arousing thoughts, feelings, and memories from consciousness. According to Freud, the most frequently repressed thoughts are of an unacceptably erotic nature. Freud believed repression was the basis for all the other anxiety-reducing defense mechanisms. The aim of psychoanalysis was to draw repressed, unresolved childhood conflicts back into consciousness to allow resolution and healing.
2. *Regression* allows an anxious person to retreat to a more comfortable, infantile stage of life. The 6-year-old who, after a new baby is born into the family, wants to sit in Mom's lap while she reads to him may be regressing to a more comfortable time.
3. *Denial* lets an anxious person refuse to admit that something unpleasant is happening. Thoughts of invincibility, such as "I won't get hooked on cigarettes; it can't happen to me," represent denial. The drinker who consumes a six-pack a day but claims not to have a drinking problem is also using the defense mechanism of denial.
4. *Reaction formation* reverses an unacceptable impulse, causing an anxious person to express the opposite of the anxiety-provoking unconscious feeling. To keep the "I hate him" thoughts from entering consciousness, the ego generates an "I love him" feeling. If you're interested in someone who is already going out with another person, and you find yourself feeling a curious dislike (instead of fondness) for the unobtainable person, then Freud would say you're experiencing reaction formation.
5. *Projection* disguises threatening feelings of guilty anxiety by attributing the problem to others. "I don't trust him" really means, "I don't trust myself." The thief thinks everyone else is a thief.

Table 28.1

Seven Defense Mechanisms

Defense Mechanism	Means of Protection
Repression	Banishing provoking thoughts (that could reemerge dreams)
Regression	Moving back to a previous psychosexual stage
Denial	Refusing to admit that something unpleasant has happened
Reaction formation	Making unacceptable impulses look like opposites
Projection	Attributing threatening impulses to others
Rationalization	Self-explaining things in a way that hides the behavior's actual reason
Displacement	Diverting aggressive feelings to an acceptable object

6. *Rationalization* displaces real, anxiety-provoking explanations and replaces them with more comforting justifications for actions. Rationalization makes mistakes seem reasonable and often sounds like an excuse. The smoker insists she smokes "just to look older" or "only when I go out with friends." After becoming addicted to cigarettes, she might say, "It's no big deal; I can quit whenever I want."
7. *Displacement* shifts an unacceptable impulse toward a more acceptable or less threatening object or person. The classic example is the company owner who becomes upset and yells at the manager, who yells at the clerk, who goes home and yells at the kids, who end up kicking the dog. All except the dog have been displacing.

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Defense Mechanisms

Rationalization can take many forms.

Freud's Psychosexual Stages

Freud's analyses of his patients led him to conclude that personality forms during the first 5 or 6 years of life. He believed that his patients' problems originated in conflicts that had not been resolved during childhood. In Freud's view, the patient had become "stuck," or *fixated,* in one of the **psychosexual stages** of development, the childhood stages of development (oral, anal, phallic, latency, and genital) during which the id's pleasure-seeking energies focus on different parts of the body (see **Table 28.2**):

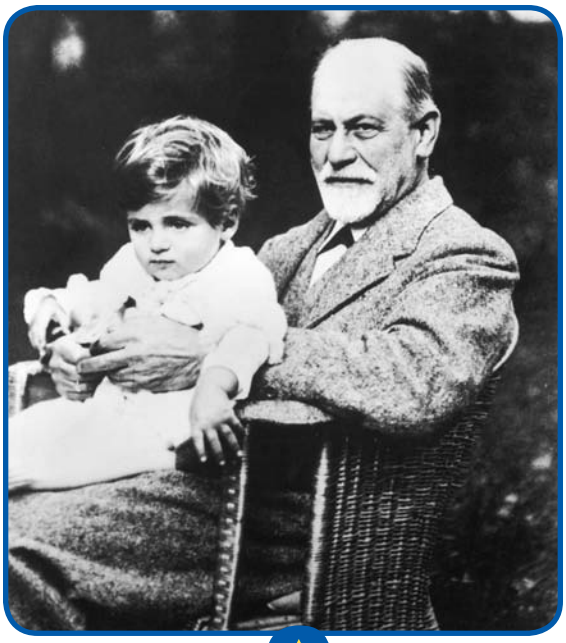
1. The *oral stage* lasts through the first 18 months of life. Pleasure comes from chewing, biting, and sucking. Weaning can be a conflict in this stage.
2. The *anal stage* lasts from 18 months to 3 years of age. Gratification comes from bowel and bladder function. Potty training can be a conflict in this stage.
3. The *phallic stage* lasts from ages 3 to 6. The pleasure zone shifts to the genitals. Freud believed boys felt love for their mothers and hatred,

Table 28.2

Freud's Psychosexual Stages

Stage	Focus
Oral (1–18 months)	Pleasure centers on the mouth—sucking, biting, chewing
Anal (18–36 months)	Pleasure focuses on bowel and bladder function; coping with demands for control
Phallic (3–6 years)	Pleasure zone is the genitals; coping with incestuous sexual feelings
Latency (6 years to puberty)	Dormant sexual feelings
Genital (puberty on)	Maturation of sexual interests

psychosexual stages Childhood stages of development (oral, anal, phallic, latency, and genital) during which, according to Freud, the id's pleasure-seeking energies focus on different parts of the body.



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Stage Theory

Freud's beliefs on development set the stage for future, research-based theories on child development.

Identification

Freud's ideas of fixation and crisis are often ridiculed in comics like this one.

OFF THE MARK.COM BY MARK PARISI
am I Sam?
MARK PARISI
CARTOON COPYRIGHTED BY MARK PARISI. PRINTED WITH PERMISSION. WWW.OFFTHEMARK.COM

Identity crisis for a popular Dr. Seuss character

fear, or jealousy for their fathers. Viewing Dad as a rival for Mom's love, the boy fears punishment from his father during the phallic stage. Freud called this collection of feelings the *Oedipus* (ED-uh-pus) *complex,* named after the Greek tragedy in which Oedipus unwittingly kills his father and marries his mother (and pokes his eyes out after realizing what he has done). Freud did not believe in a parallel process for girls, although other psychoanalysts have written about an Electra complex, in which girls love Dad and fear Mom.

4. During the *latency stage,* which lasts from 6 years of age to puberty, children repress their feelings for the rival parent. Instead of fearing the same-sex parent, girls and boys start to "buddy up" to Mom and Dad, respectively. The result is girls learn to do girllike things and boys learn boylike behaviors. Freud called this the *identification process.* This process offers one explanation of *gender identity,* which is our sense of what it means to be either male or female.
5. The *genital stage* starts at puberty, as the person begins experiencing sexual feelings toward others.

Freud thought that unresolved conflicts in any of the psychosexual stages could cause problems later in life. The adult who has not worked through the conflict associated with a given stage may be fixated to that stage. For instance, a child who has a bad experience during potty training may develop an anal fixation. This conflict may manifest itself, wrote Freud, in the adult who likes everything neat, perfect, and in its proper place. (Now you know where the label "anal-retentive" comes from!)

PAUSE NOW OR MOVE ON

Turn to page 510 to review and apply what you've learned.

The Neo-Freudians

WHAT'S THE POINT?

28-2 How did later psychodynamic theorists assess personality, and what were the new concepts added to psychodynamic theory by the neo-Freudians?

Freud attracted many followers. Those who agreed with the basic ideas of psychoanalysis but disagreed with specific parts of Freud's theory were known as *neo-Freudians*. Three of these pioneering psychoanalysts were Alfred Adler, Carl Jung, and Karen Horney.

Alfred Adler

Alfred Adler agreed with Freud's views on the importance of childhood experiences, but he thought social tensions (not sexual tensions) were crucial in the development of personality. Adler believed that psychological problems in personalities centered on feelings of inferiority. Furthermore, if we start to organize our thoughts based on our perceived shortcomings or mistakes, we might develop an **inferiority complex.** (This is the origin of another famous label you've probably already heard.)

Carl Jung

Unlike Adler, **Carl Jung** (pronounced YOO-ng) discounted social factors, but he broke with Freud over the importance of the role of the unconscious in personality development. Jung kicked the idea up a notch, saying we not only have an individual unconscious but also—as a species—have a **collective unconscious.** This is a shared, inherited reservoir of memory traces from our ancestors. Jung thought the collective unconscious included information hardwired from birth on things we all know. He saw evidence of the collective unconsciousness in the *archetypes* (pronounced AR-kuh-types), or universal symbols, found in stories, myths, and art. For instance, the shadow archetype is the darker, evil side of human nature. Supposedly, we hide this archetype from the world and ourselves.

Contemporary psychologists reject the notion of inherited memory. However, many believe that our shared evolutionary history has contributed to some universal behavior tendencies (like hiding our worst secrets from others) or dispositions (evil).

Karen Horney

Trained as a psychoanalyst, **Karen Horney** (pronounced HORN-eye) broke from Freud in several ways. She pointed out that Freud's theory was male dominated and that his explanation of female development was inadequate. She also stated that social variables, not biological variables, are the foundation of personality development. She felt that social expectations, not anatomy, created the psychological differences between males and females. Basic anxiety, wrote Horney, is the helplessness and isolation people feel in a potentially hostile world, brought on by the competitiveness of today's society (Horney, 1950). Horney and the other neo-Freudians started the movement toward revising Freud's psychoanalysis into the psychodynamic perspective that is primarily used today.

inferiority complex According to Adler, a condition that comes from being unable to compensate for normal inferiority feelings.

collective unconscious Jung's concept of a shared, inherited reservoir of memory traces from our ancestors.

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ALFRED ADLER (1870–1937) Neo-Freudian who thought social tensions were more important than sexual tensions in the development of personality.

HULTON ARCHIVE/GETTY IMAGES

CARL JUNG [YOO-ng] (1875–1961) Neo-Freudian who believed that humans share a collective unconscious.

BETTMANN/CORBIS

KAREN HORNEY [HORN-eye] (1885–1952) Neo-Freudian who found psychoanalysis negatively biased toward women and believed cultural variables are the foundation of personality development.

projective test A personality test, such as the Rorschach or TAT, that provides ambiguous stimuli to trigger projection of inner thoughts and feelings.

Thematic Apperception Test (TAT) A projective test in which people express their inner feelings and interests through the stories they make up about ambiguous scenes.

Rorschach inkblot test The most widely used projective test is a set of 10 inkblots designed to identify people's inner feelings by analyzing their interpretations of the blots.

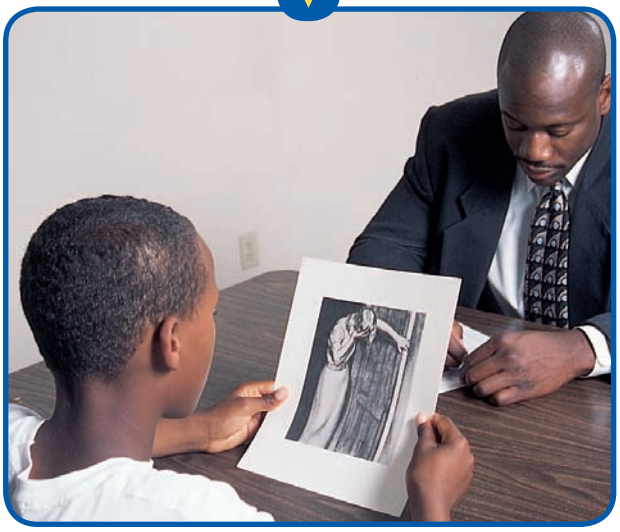
Assessing Personality From a Psychodynamic Perspective

Before providing therapy for a personality disorder, psychologists need to assess personality characteristics. Techniques for assessing personality characteristics differ from one perspective to another because the tests are tailored to a particular theory of personality. Psychoanalytic and psychodynamic therapists want assessments that reach into and reveal elements of the unconscious. True-false tests are of no interest, as they would only tap into surface elements of the conscious. Instead, Freud turned to assessment techniques such as dream analysis, which he called the "royal road to the unconscious." Later psychodynamic theorists became interested in **projective tests,** personality tests that provide ambiguous stimuli to trigger projection of inner thoughts and feelings. Projective tests are designed to provide insight into the test-taker's unconscious motives, and therapists use several kinds of such tests. Two particularly well-known projective tests are the Thematic Apperception Test (TAT) and the Rorschach inkblot test.

- The **Thematic Apperception Test (TAT)** is a projective test in which people express their inner feelings and interests through the stories they make up about ambiguous scenes. The images are deliberately ambiguous—you can't really tell what's happening. If you were taking a TAT, you might be shown a picture of two men in a room, one seated and looking out a window and the other standing with his back turned to the camera. The person administering the test would ask you to tell stories about the image, describing what is going on in the picture, as well as what happened before and after the scene.
- The **Rorschach** (pronounced ROAR-shock) **inkblot test,** designed by Hermann Rorschach, is the most widely used projective test. It is a set of 10 inkblots that a therapist uses to identify people's inner feelings by analyzing their interpretations of the inkblot. If you were taking this test, you would be asked to look at an inkblot and describe what you see. If you see a bat on a part of the inkblot where most people see a bat, your response would be considered "normal." But if you see a gun where most people see a bat, you might be revealing an aggressive personality.

The TAT

Some psychologists believe that patients who tell stories about ambiguous pictures are projecting feelings they have about themselves.



LEW MERRIM/PHOTO RESEARCHERS, INC.

Are there problems with tests like the Rorschach? *Yes.* Research has shown that people functioning normally run the risk of being diagnosed as pathological by those administering this inkblot assessment (Wood et al., 2006). And even though researchers equipped with computer-aided scoring programs have expressed confidence that the situation will improve (Exner, 2003), there is a fair chance that two or more raters will score the same inkblot responses in different ways. This means that the test is not reliable. No one has

developed any single, universally accepted scoring system for this test. Furthermore, the Rorschach is not the emotional X-ray some hoped it would be. The scientific community now agrees that the Rorschach does not accurately predict personality characteristics (Sechrest et al., 1998).

Some clinicians use the Rorschach to break the ice at the start of a therapy session; others use it as part of a series of personality tests and look for trends among all the results. But critics maintain there is "no scientific basis for justifying the use of the Rorschach scales in psychological assessments" (Hunsley & Bailey, 1999, p. 266).

LEW MERRIM/PHOTO RESEARCHERS, INC.

The Rorschach

A therapist attempts to understand this girl's personality and her emotional well-being by analyzing her interpretations of the inkblot.

PAUSE NOW OR MOVE ON

Turn to page 511 to review and apply what you've learned.

Evaluating the Psychodynamic Perspective

WHAT'S THE POINT?

28-3 How have contemporary researchers evaluated the validity of the psychodynamic perspective on personality?

No discussion of Freud's work would be complete without an update and critique. Indeed, most contemporary psychodynamic theorists do not believe Freud's assertion that sex is the basis of personality (Westen, 1996). Nor do they classify patients as "oral" or "anal." They do agree with Freud that much of our mental life is unconscious; that we struggle with inner conflicts among values, wishes, and fears; and that childhood experiences shape our personalities (Erdelyi, 2006).

Freud's personality theory was comprehensive, unlike any personality theory before. It influenced psychology, literature, religion, and even medicine. Still, we need to be aware of some of the weaknesses of this perspective:

- Freud's work was based on individual case studies of troubled upper-class Austrian white women who lived one hundred years ago. Are their experiences applicable to a population of, say, today's middle-class Japanese men? Were the results even applicable to most Austrian women outside Freud's study a century ago? Probably not.
- Development is a lifelong process; it is not fixed in childhood.
- Boys' gender identity does not result from an Oedipus complex around the time of kindergarten. Gender identity is achieved even without a same-sex parent around the house (Frieze et al., 1978).
- Freud underestimated peer influence on personality development, and he overestimated parental influence.

- The neural network of children under age 3 is insufficiently developed to sustain the kind of emotional trauma Freud described.
- Freud asked his patients leading questions that may have led to false recall of events that never happened (Boag, 2006; Powell & Boer, 1994). These same concerns exist today over reports of "repressed memories" of childhood sexual abuse. Evidence suggests therapists may inadvertently implant false memories of abuse in the way they ask clients questions (Erdelyi, 2006; Ofshe & Watters, 1994).
- Freud's personal biases are evident in his focus on male development.
- Freud's theory is not scientific. It's difficult to submit concepts such as the Oedipus complex or the id to the rigors of scientific testing.

Freud left a lasting legacy, even if most of the references to concepts such as psychoanalysis are now outside psychology (Cohen, 2007). Our language is filled with psychoanalytic terms, from *repression* to *inferiority complex*. Freud's ideas have been steadily declining in importance in the academic world for years, but some therapists, talk show hosts, and the public still love the concepts (Seligman, 1994).

PAUSE NOW OR MOVE ON

Turn to page 511 to review and apply what you've learned.

The Humanistic Perspective on Personality

WHAT'S THE POINT?

28-4 How did the humanistic psychologists view personality and how our personality changes and grows?

In contrast to Freud's focus on unconscious thought and troubled people, **humanistic psychology** focuses on conscious experiences, the individual's freedom to choose, and the individual's capacity for personal growth. This movement began gaining credibility and momentum in the United States in the 1960s. Humanistic psychologists wanted a psychology that

1. emphasized conscious experience.
2. focused on free will and creative abilities.
3. studied all factors (not just observable behaviors) relevant to the human condition (Schultz & Schultz, 2008).

Humanistic psychologists thought psychology in the 1960s was ignoring human strengths and virtues. Freud studied the motives of "sick" people, those who came to him with psychological problems. Humanists, such as Abraham

humanistic psychology A perspective that focuses on the study of conscious experience, the individual's freedom to choose, and the individual's capacity for personal growth.

self-actualization According to Maslow, an ultimate psychological need that arises after basic physical and psychological needs are met and self-esteem is achieved; the motivation to realize our full and unique potential.

Maslow and Carl Rogers, thought we should also study "healthy" people. They believed human personality was shaped more by our unique capacity to determine our future than by our unconscious conflicts or past learning.

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ABRAHAM MASLOW (1908–1970) Humanistic psychologist who proposed the hierarchy of needs, with self-actualization as one of the ultimate psychological needs.

Abraham Maslow and Self-Actualization

Studying psychologically healthy people, **Abraham Maslow** constructed a *hierarchy of needs* (1970) to help explain personality and personal growth (see **Figure 28.2**). Maslow believed we must satisfy our basic physiological needs for food, water, and air before attempting to meet the security and safety needs of the second level of the hierarchy, and the love and belongingness of the third level. Then, after meeting our needs for self-esteem, we could finally strive to achieve our full and unique potential as humans and obtain **self-actualization,** one of the highest levels of his hierarchy. The self-actualized person works toward a life that is challenging, productive, and meaningful.

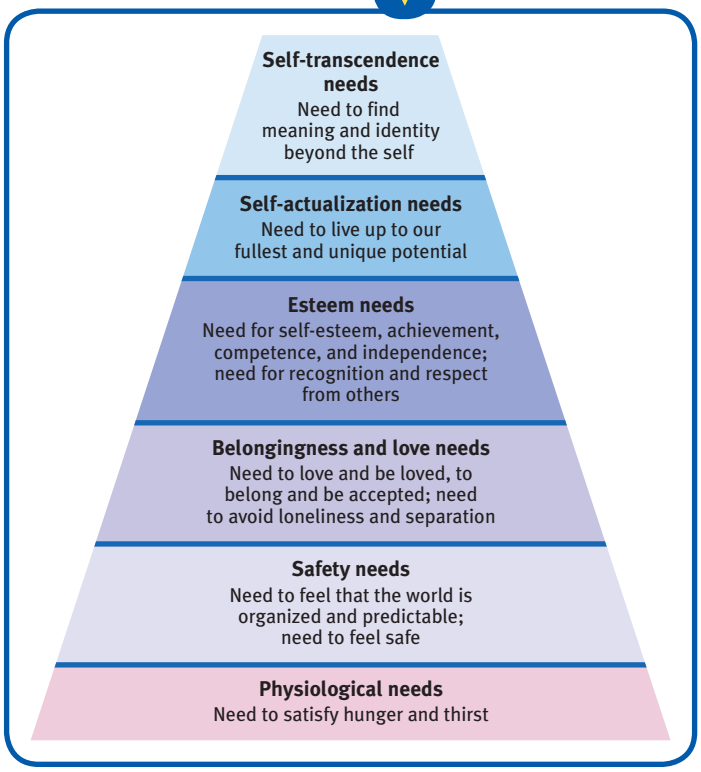
Searching for examples of self-actualized people, Maslow studied paragons of society, like Eleanor Roosevelt and Abraham Lincoln. He found that those who live productive and rich lives are

- self-aware and self-accepting.
- open and spontaneous.
- loving and caring.
- not paralyzed by others' opinions.
- focused on a particular task they often see as a mission.
- involved in a few deep relationships, not many superficial ones.
- likely to have been moved by personal peak experiences that surpass ordinary consciousness.

These mature adult qualities, wrote Maslow, are found in those who have "acquired enough courage to be unpopular," discovered their calling, and learned enough in life to be compassionate. These individuals have also outgrown any mixed feelings toward their parents and are "secretly uneasy about the cruelty, meanness, and mob spirit so often found in young people" (Schultz & Schultz, 2008).

Figure 28.2
Abraham Maslow's Hierarchy of Needs

Maslow's theory proposes that we must satisfy our basic physiological needs before we can try to meet higher-level safety and psychological needs. (From Maslow, 1970.)


Self-transcendence needs
Need to find meaning and identity beyond the self
Self-actualization needs
Need to live up to our fullest and unique potential
Esteem needs
Need for self-esteem, achievement, competence, and independence; need for recognition and respect from others
Belongingness and love needs
Need to love and be loved, to belong and be accepted; need to avoid loneliness and separation
Safety needs
Need to feel that the world is organized and predictable; need to feel safe
Physiological needs
Need to satisfy hunger and thirst

Carl Rogers and the Person-Centered Approach

Humanistic psychologist **Carl Rogers** agreed with Maslow that people are good and strive for self-actualization. Rogers (1980) viewed people much like seeds that thrive when they have the right

mixture of ingredients. Just as seeds flourish when given water, soil, and sun, Rogers said, people will flourish when given acceptance, genuineness, and empathy.

How do we nurture proper human growth in others? By being *accepting*—ideally, through **unconditional positive regard,** or an attitude of total acceptance toward another person. This attitude values others even though we are aware of their faults and failings. Rogers thought that family members and close friends who express unconditional positive regard for us provide us with great relief. We can let go, confess our most troubling thoughts, and not have to explain ourselves.

CARL ROGERS (1902–1987) Humanistic psychologist who developed client-centered therapy and stressed the importance of acceptance, genuineness, and empathy in fostering human growth.

We also nurture growth by being *genuine,* according to Rogers. Genuine people freely express their feelings and aren't afraid to disclose details about themselves.

Finally, we nurture growth by being *empathic*. Empathy involves sharing thoughts and understanding and reflecting the other person's feelings. The key to empathy is listening with understanding. When the listener shows understanding, the person sharing feelings has an easier time being open and honest. Rogers wrote, "Listening, of this very special kind, is one of the most potent forces for change that I know" (Schultz & Schultz, 2008).

Acceptance, genuineness, and empathy help build a strong relationship between parent and child, teacher and student, manager and employee, or any two people. Rogers believed these three qualities—unconditional positive regard, genuineness, and empathy—are particularly important in the relationship between a client and a therapist.

Assessing Personality and the Self From a Humanistic Perspective

If Rogers, Maslow, or any humanistic psychologist wanted to assess your personality, he or she probably would ask you to answer questions that would help evaluate your self-concept. Your **self-concept** includes all your thoughts and feelings about yourself in answer to the question "Who am I?" Rogers, for example, often asked clients to describe themselves first as they actually were and then as they would ideally like to be. He believed that the closer the actual self was to the ideal self, the more positive the person's self-concept. Assessing personal growth during therapy was a matter of measuring the difference between ratings of ideal self and actual self (see **Figure 28.3**).

unconditional positive regard According to Rogers, an attitude of total acceptance toward another person.

self-concept All our thoughts and feelings about ourselves in answer to the question "Who am I?"

For some humanistic psychologists, any kind of structured personality test is simply too impersonal and detached from the real person. For them, only a series of lengthy interviews and personal conversations can allow us to understand an individual's unique experiences and personality.

PAUSE NOW OR MOVE ON

Turn to page 511 to review and apply what you've learned.

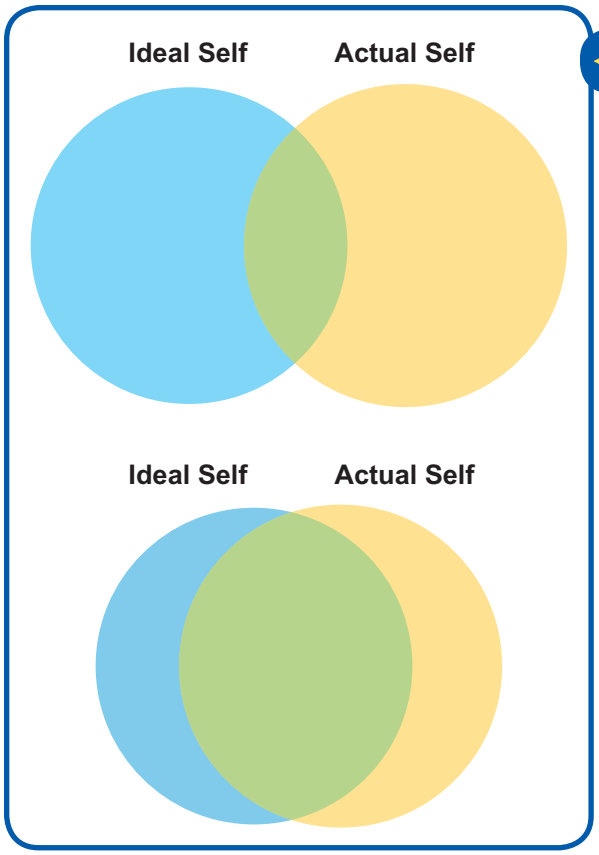


Figure 28.3
Self-Concept

Humanistic psychologists believed that the way you describe yourself ("actual self") and the way you'd like to describe yourself ("ideal self") should overlap. They thought the more they overlap, the better you feel about yourself.

Evaluating the Humanistic Perspective

WHAT'S THE POINT?

28-5 How have contemporary research findings evaluated the validity of the humanistic perspective on personality?

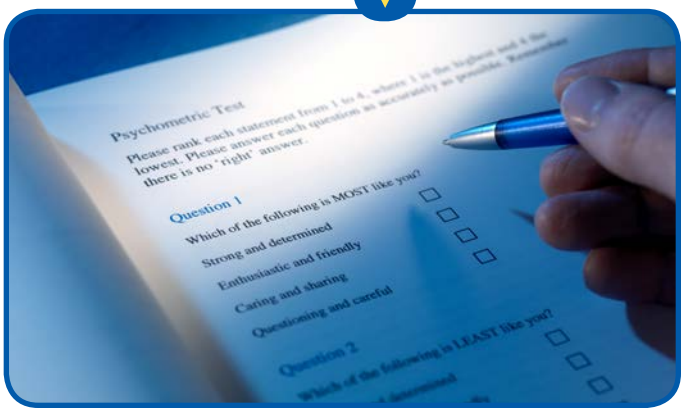
Carl Rogers once said, "Humanistic psychology has not had a significant effect on mainstream psychology. We are perceived as having relatively little importance" (Cunningham, 1985). Was Rogers correct?

Society has benefited from humanistic psychology. Therapy practices, child-rearing techniques, and workplace management can all attest to a positive humanistic influence.

But there have been unintentional negative effects as well. Some people have mistakenly interpreted unconditional positive regard for children as meaning that we should never offer constructive criticism to a child—or worse, never tell a child no. Critics also point out that many humanistic terms are vague and hard to define precisely so that other researchers can test them. Maslow, for example, stated that the

Too Impersonal?

Most humanistic psychologists believe that written personality tests are not an adequate way to assess personality. They prefer conversations and interviews that reveal the individual's uniqueness.



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self-actualized person is *spontaneous, loving,* and *productive.* How do we define these terms to allow Maslow's assumptions to be tested scientifically? Without such tests, how do we know whether these terms simply reflect Maslow's personal values?

Whatever its effect on mainstream psychology, humanistic psychology laid the foundation for the positive psychology movement that began in the 1990s. As a result, many researchers are studying the human strengths and virtues (like bravery, gratitude, and kindness) of healthy people, rather than just the disorders of those who are not psychologically healthy. Martin Seligman, the leader of this new movement, has called research "the protector and shield" of positive psychology (2001). His point is that most humanistic psychology proponents were not connected with university research labs. Without the research to back up its ideas, humanistic psychology faded.

PAUSE NOW OR MOVE ON

Turn to page 512 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 28

Thinking About Psychodynamic and Humanistic Perspectives on Personality

The Psychodynamic Perspective on Personality

WHAT'S THE POINT?

28-1 How does the psychodynamic perspective explain personality?

- Sigmund Freud's psychoanalytic theory was the first comprehensive personality theory. Freud believed that an individual's personality emerges from tensions generated by unconscious motives and unresolved childhood conflicts. Personality results from the interaction of three forces: id, ego, and superego.

- Freud used various techniques, like free association, to reveal unacceptable thoughts, wishes, feelings, and memories held in the unconscious mind. Freud explained many of our thoughts and behaviors as defense mechanisms, protective methods of reducing anxiety by unconsciously distorting reality.
- The Freudian perspective held that personality forms during the first 5 or 6 years of life and is influenced by development through five psychosexual stages.

Apply What You Know

1. Sigmund Freud thought that personality was most influenced by
   a. defense mechanisms.
   b. the unconscious mind.
   c. repression.
   d. free association.
2. According to Freud, a traumatic childhood memory might be
   a. encoded into the neural network of the hippocampus.
   b. the reason for a larger "iceberg" of id, ego, and superego.
   c. repressed into the unconscious mind.
   d. the basis of the ego.

The Neo-Freudians

WHAT'S THE POINT?

28-2 How did later psychodynamic theorists assess personality, and what were the new concepts added to psychodynamic theory by the neo-Freudians?

- Neo-Freudians such as Alfred Adler, Carl Jung, and Karen Horney agreed with the basic ideas of psychoanalysis, but each introduced new ideas by modifying some part of Freud's theory.
- Later psychodynamic theorists used projective tests (like the TAT and the Rorschach inkblot test) to reveal unconscious thoughts and associations.

Apply What You Know

3. The neo-Freudians generally agreed with Freud's basic theory of the unconscious but disagreed with Freud's emphasis on
   a. the importance of sexual tensions and sexual anxiety.
   b. the importance of social tensions.
   c. archetypal symbols of the collective unconscious.
   d. personality development in females.
4. True or False: The main purpose of a projective test is to reveal unconscious thoughts and tensions.

Evaluating the Psychodynamic Perspective

WHAT'S THE POINT?

28-3 How have contemporary researchers evaluated the validity of the psychodynamic perspective on personality?

- The modern psychodynamic perspective on personality incorporates some aspects of Freudian theory, such as the connection between personality and unconscious thought processes.
- Freud's theory was not scientific and was based on interpretations of reports from a nonrepresentative group of patients. Several of Freud's original claims (for example, the Oedipus complex creating gender identity in boys) have been disproved by more recent psychological research.

Apply What You Know

5. Why is Freud's theory considered unscientific?
6. Which Freudian conclusion do most contemporary psychodynamic theorists support?
   a. Development is fixed in childhood.
   b. Much of our mental life is unconscious.
   c. Gender identity can be achieved only when a child has a same-sex parent in the home.
   d. A focus on male personality development is the right approach.

The Humanistic Perspective on Personality

WHAT'S THE POINT?

28-4 How did the humanistic psychologists view personality and how our personality changes and grows?

- Humanistic psychology is based on the optimistic view that all of us are striving to improve our personalities and become the best people we can be. It emphasizes freedom and our ability to choose our own directions in life.
- Abraham Maslow constructed a hierarchy of needs to help explain personality and personal growth of psychologically healthy people toward self-actualization.
- Carl Rogers believed that people need unconditional positive regard, as well as a genuine and empathic environment, to overcome obstacles and develop in healthy ways.
- Humanistic psychologists assess personality through questions that reveal an individual's ideal and actual self-concepts.

Apply What You Know

7. What is one of the most important differences between the humanistic and psychodynamic personality theories?
   a. Humanists focus on "healthy" personalities, and the psychodynamic theorists focus on "sick" personalities.
   b. Psychodynamic theory is historical, and humanistic theory is current.
   c. Freud is much more well known than Abraham Maslow.
   d. Psychodynamic theory is based on scientific method, but humanistic psychology is based only on stories.
8. Which personality theorist would most likely agree with the statement "Patients need to know that we respect them, no matter what choices they make"?
   a. Karen Horney
   b. Sigmund Freud
   c. Alfred Adler
   d. Carl Rogers

Evaluating the Humanistic Perspective

WHAT'S THE POINT?

28-5 How have contemporary research findings evaluated the validity of the humanistic perspective on personality?

- The rise of humanistic psychology influenced therapy practices, child-rearing techniques, and workplace management theories.
- The theory is often misinterpreted, however, and it is difficult to establish through research because many humanistic terms are vague and hard to define.
- Humanistic psychology laid the foundation for the positive psychology movement, which has the advantage of being research based.

Apply What You Know

9. Some parents have mistakenly interpreted unconditional positive regard as meaning they should never offer _____ to a child.
10. Humanistic psychology helped pave the way for _____.

KEY TERMS AND KEY PEOPLE

personality, p. 495
psychoanalysis, p. 496
psychodynamic perspective, p. 496
free association, p. 497
preconscious, p. 497
unconscious, p. 497
resilience, p. 498
id, p. 499
superego, p. 499
ego, p. 499
defense mechanisms, p. 499
psychosexual stages, p. 501
inferiority complex, p. 503
collective unconscious, p. 503
projective test, p. 504
Thematic Apperception Test (TAT), p. 504
Rorschach inkblot test, p. 504
humanistic psychology, p. 506
self-actualization, p. 507
unconditional positive regard, p. 508
self-concept, p. 508
Sigmund Freud (1856–1939), p. 496
Alfred Adler (1870–1937), p. 503
Carl Jung [YOO-ng] (1875–1961), p. 503
Karen Horney [HORN-eye] (1885–1952), p. 503
Abraham Maslow (1908–1970), p. 507
Carl Rogers (1902–1987), p. 508

MODULE 29

Trait and Social-Cognitive Perspectives on Personality

The Trait Perspective

- Identifying Traits
- The "Big Five" Traits
- Testing for Traits
- Evaluating the Trait Perspective

The Social-Cognitive Perspective

- Interacting With Our Environment: Three Influences
- Personal Control
- Assessing Behavior in Situations
- Evaluating the Social-Cognitive Perspective

Are you open? Outgoing? Agreeable? Psychologists study the traits we often use to describe others and ourselves.

Remember the last time a friend asked for your opinion of another person? Perhaps you said that person was generous, friendly, and sweet, or maybe you described someone who was self-centered, cranky, and mean. Terms like these describe **traits,** aspects of personality that are relatively consistent. Some psychologists who study **personality**—an individual's characteristic pattern of thinking, feeling, and acting—find traits a useful tool for describing different personality types. Psychologists taking this *trait perspective* tend to consider our consistent patterns of behavior, those that we're born with and that stay fairly constant across situations.

Other psychologists believe that understanding personality involves considering how people are affected by a particular situation, by what they have learned, by how they think, and by how they interact socially. Psychologists who take this **social-cognitive perspective** would consider how the same person could be generous in one situation and self-centered in another, or friendly and sweet on one day and cranky and mean the next.

In this module, we take a closer look at these two perspectives on personality.

traits Aspects of personality that are relatively consistent.

personality An individual's characteristic pattern of thinking, feeling, and acting.

social-cognitive perspective A perspective stating that understanding personality involves considering how people are affected by a particular situation, by what they have learned, by how they think, and by how they interact socially.

The Trait Perspective

WHAT'S THE POINT?

29-1 Are there different personality types? If so, how do trait theorists suggest that we describe and measure them?

Think of the last car you rode in, perhaps on your way to or from school. What kind of car was it? What about the color? Was it a compact, small, medium, or large car? Note how we are using descriptive techniques to classify the cars as distinct *types*. Can we use similar techniques to classify personalities? People have been attempting to do so for millennia.

Thousands of years ago, the ancient Greeks classified personalities using four types: sanguine (cheerful), melancholic (depressed), choleric (irritable), and phlegmatic (unemotional). And how did the ancient Greeks explain whether you were cheerful or irritable? They spoke of your body fluids, or "humors." If melancholic humor filled your body, for example, you had a depressive personality.

Psychologists still use descriptive techniques to classify personality, but they now attempt to identify characteristic and consistent patterns of behavior using valid and reliable assessment techniques. (Don't confuse these techniques with the tests you find online and in teen magazines. Unfortunately, most of those "personality assessments" are no more valid or reliable than the ancient Greeks' descriptions of "humors.")

Personality Types

How would the ancient Greeks have classified this personality type?

MEL STOUTSENBERGER/ISTOCKPHOTO

PAUSE NOW OR MOVE ON

Turn to page 529 to review and apply what you've learned.

Identifying Traits

WHAT'S THE POINT?

29-2 How did psychologists Gordon Allport, Raymond Cattell, and Hans Eysenck identify traits?

One early attempt to classify personality made assumptions based on a person's body type. In this view, overweight people were viewed as jolly and thin people as high strung (Sheldon, 1954). Personality researchers realized, however, that these oversimplified classification systems tend to eliminate each person's individuality. Three researchers—Gordon Allport, Raymond Cattell, and Hans Eysenck—offered broader alternatives to account for these trait variations.

Gordon Allport's Trait Theory

After graduating from college, **Gordon Allport** traveled to Vienna to visit Sigmund Freud, the Austrian physician famous for his theory of psychoanalysis. Their meeting profoundly affected the trait theory Allport developed years later.

At the time, Freud was developing his theory of the unconscious, a hidden reservoir of unacceptable thoughts and feelings. He viewed personality as the result of a long history of interactions between the unconscious and conscious minds of a person. Freud often studied people with psychological conflicts, and he searched for answers in childhood experiences.

Allport disagreed with Freud in many ways. First, Allport played down the role of the unconscious in healthy people. Unlike Freud, Allport believed personality should be studied only in normal adults, not in those suffering from a psychological problem. Furthermore, wrote Allport, current experiences have a far greater effect on an adult than the early childhood experiences upon which Freud dwelled.

Allport also resisted the idea of a "personality law" that would apply to everyone. Instead, he strongly believed that individual personalities are unique. This belief, which manifested itself in his trait theory, led psychology in two directions. First, Allport identified several kinds of traits, which paved the way for other personality researchers and brought respectability to the study of personality (Schultz & Schultz, 2008). The second direction was more problematic: Allport's emphasis on individual uniqueness made it difficult to produce general ideas that could be tested by others. Allport had listed more than 18,000 ways to describe people (Allport & Odbert, 1936). Would it be possible to condense all the possible traits into a manageable few? The answer was *Yes,* according to Raymond Cattell.

GORDON ALLPORT (1897–1967) American psychologist and trait theorist who researched the idea that individual personalities are unique.

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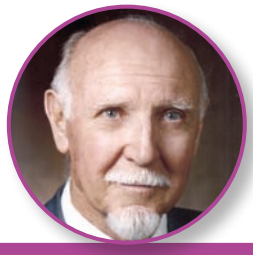

RAYMOND CATTELL [kuh-TELL] (1905–1998) English psychologist who researched whether some traits predicted others; he proposed 16 key personality dimensions or factors to describe personality.

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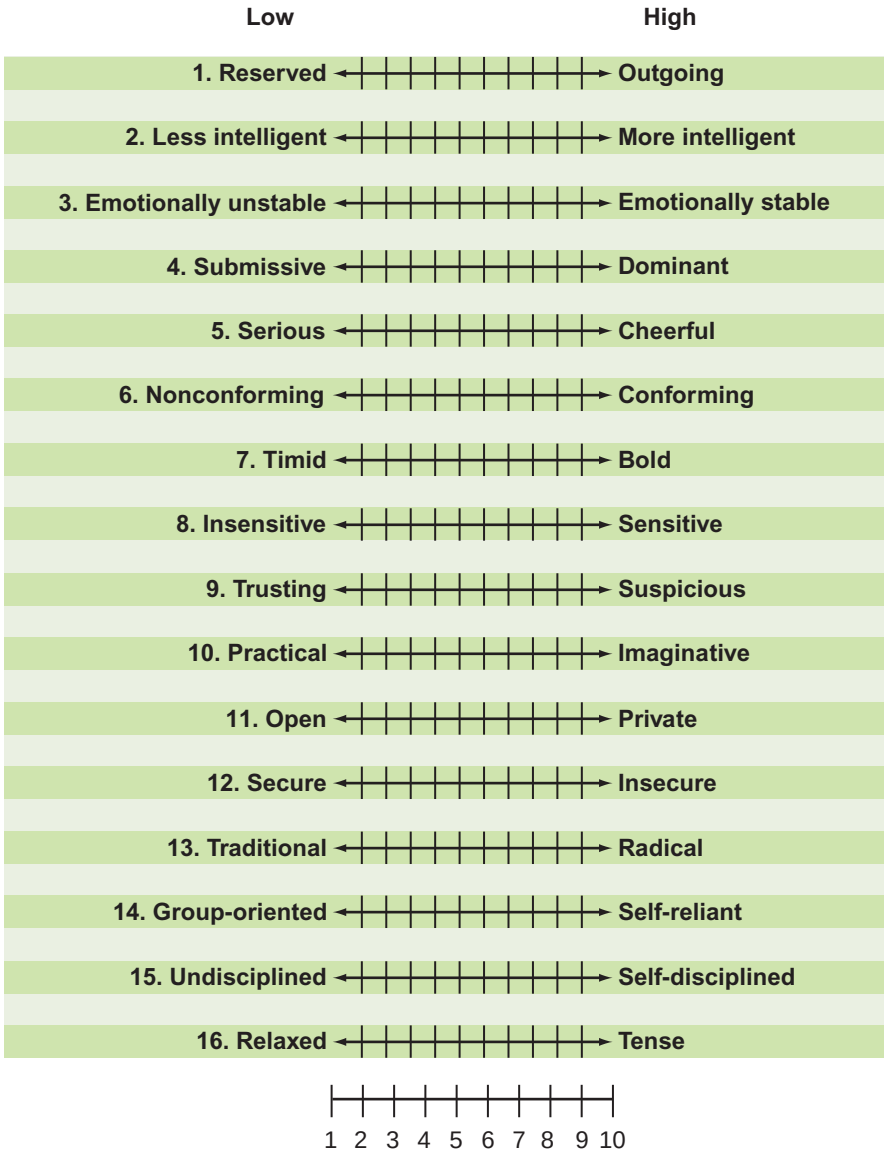
Raymond Cattell's Factor Analysis

English psychologist **Raymond Cattell's** (pronounced kuh-TELL) contribution to the trait perspective flowed from his interest in knowing whether some traits predicted others. For instance, if you identify yourself as timid, are you more likely to report feeling suspicious? Cattell used statistical techniques, especially *factor analysis,* to compute the relationships among traits until he came up with 16 core personality

Figure 29.1
Raymond Cattell's 16 Personality Dimensions or Factors

Cattell identified 16 core personality dimensions, or factors, each of which has a continuum with a "low" end and a "high" end. For instance, on the tension dimension you could rate anywhere between "relaxed" and "tense." (Adapted from Cattell, 1963.)



dimensions, or factors (see **Figure 29.1**) (Wiggins, 1984). Each factor can be measured using a questionnaire and plotted on a continuum (Cattell, 1963). Take, for instance, social boldness: How would you rate yourself on a scale of 1 to 10 on the timid–bold continuum, where 1 equals timid and 10 equals bold? Such ratings produce a profile for the individual being assessed.

How many factors are there to personality? Cattell insisted personality should be assessed using 16 factors or traits (Cattell & Krug, 1986). However, Hans Eysenck thought 16 were too many (see Figure 29.1).

CLIVE BARDA/ARENAPAL/THE IMAGE WORKS

HANS EYSENCK [EYE-zink] (1916–1997) German psychologist who researched the genetically influenced dimensions of personality, including extraversion and introversion.

Hans Eysenck's Biological Dimensions

German psychologist **Hans Eysenck** (pronounced EYE-zink) searched for personality dimensions in biology, and his model of genetically influenced dimensions has broad research support. Like Cattell, Eysenck used statistical analysis to come up with his dimensions. Two of his findings are the extraversion–introversion dimension and the emotional stability–instability dimension.

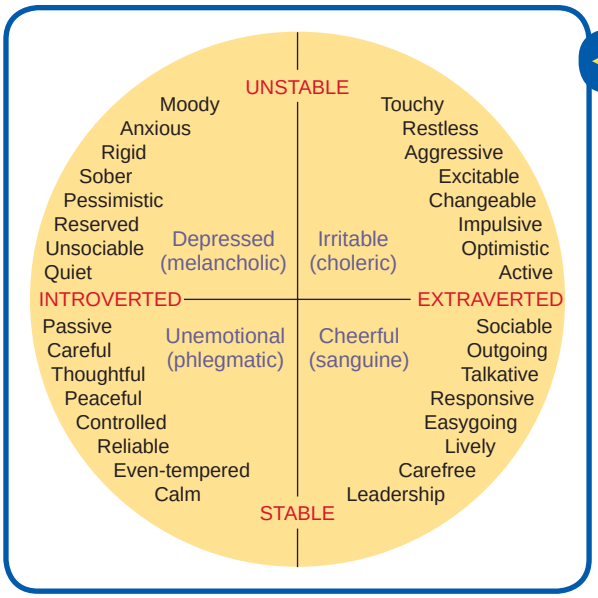


Figure 29.2
Hans Eysenck's Personality Factors

Eysenck predicted that personality traits were inherited. Notice how Eysenck's four quadrants align with the four personality types of the ancient Greeks. (From Eysenck & Eysenck, 1963.)

Extraverts, according to Eysenck, are outgoing and sociable; *introverts* keep to themselves and are quiet. Emotionally stable people are generally relaxed and calm, whereas emotionally unstable people are anxious and tend to worry. Analyzing data from a questionnaire he developed, Eysenck found he could predict personality traits along these biologically inherited dimensions (Eysenck & Eysenck, 1963) (see **Figure 29.2**).

Eysenck, Cattell, and Allport were all leaders in personality assessment. Building on their work, researchers have now identified a new core set of personality factors.

PAUSE NOW OR MOVE ON

Turn to page 529 to review and apply what you've learned.

The "Big Five" Traits

WHAT'S THE POINT?

29-3 What are the dimensions of the "Big Five" trait theory?

Clearly, there is some debate over the number of basic personality traits. How many traits would it take to adequately describe your best friend? Would 3 be enough to paint this picture? Would 16 cause you to start repeating yourself? In the mid-1980s, researchers decided that an adequate description of personality relied on five essential factors now usually referred to as the "Big Five" (Jang et al., 1998; Wiggins, 1996). Try it for yourself. Can you give an adequate description of your best friend using the five dimensions in **Figure 29.3?** Findings from around the world show that most people tend to mention these five traits when describing one another (Costa & McCrae, 2006; Schmitt et al., 2007).

Figure 29.3
The Big Five Personality Factors

Most personality theorists tend to agree human personality can be described using these factors or traits. (Adapted from McCrae & Costa, 1996.)

The "Big Five" Personality Factors

(*Memory tip*: Picturing a CANOE will help you recall these.)

Trait Dimension	Endpoints of the Dimension		
Conscientiousness	Organized	↔	Disorganized
	Careful	↔	Careless
	Disciplined	↔	Impulsive
Agreeableness	Soft-hearted	↔	Ruthless
	Trusting	↔	Suspicious
	Helpful	↔	Uncooperative
Neuroticism (emotional stability vs. instability)	Calm	↔	Anxious
	Secure	↔	Insecure
	Self-satisfied	↔	Self-pitying
Openness	Imaginative	↔	Practical
	Preference for variety	↔	Preference for routine
	Independent	↔	Conforming
Extraversion	Sociable	↔	Retiring
	Fun-loving	↔	Sober
	Affectionate	↔	Reserved

The Big Five traits—conscientiousness, agreeableness, neuroticism, openness, and extraversion (memory trick: use the first letter of each trait to spell *canoe*)—appear to be stable in adults. This means that it's unlikely an agreeable 30-year-old will suddenly become suspicious and uncooperative at age 60. In fact, agreeableness and conscientiousness tend to increase as you get older (Srivastava et al., 2003).

Genetic predispositions influence personality traits (Loehlin et al., 1998). *Predisposition* merely means that a biological tendency to develop a trait exists. Whether the trait actually will develop may depend on environmental factors (such as stress or upbringing). The Big Five traits also predict other personal attributes. For example, marital satisfaction typically suffers for those scoring low on agreeableness, stability, and openness (Botwin et al., 1997; Donnellan et al., 2004).

Do the Big Five represent all we need to know about personality traits? Some argue the Big Five should be expanded to include dimensions such as positive and negative emotion or femininity and masculinity. Further assessment of traits may someday expand the Big Five to the Big Six or Big Seven. For now, the Big Five do a good job of describing personality's essential factors.

PAUSE NOW OR MOVE ON

Turn to page 529 to review and apply what you've learned.

Testing for Traits

WHAT'S THE POINT?

29-4 How do trait theorists assess personality?

personality inventories
Questionnaires (often with true-false or agree-disagree items) on which people respond to items designed to gauge a range of feelings and behaviors; used to assess selected personality traits.

Some personality researchers use projective tests to assess personality by asking people to tell stories about ambiguous pictures—images where the meaning is not clear. Trait researchers prefer **personality inventories,**

questionnaires on which people respond to items designed to gauge a range of feelings and behaviors. These two approaches differ in important ways. *Projective tests* ask the person being tested to "project" unconscious motives onto an ambiguous image in a free-flowing, narrative style. In contrast, personality inventories are *objective tests*. Test-takers provide written answers to standardized questions, which are usually in the form of true-false or multiple-choice.

Objective tests have shown greater **validity**—the extent to which a test measures or predicts what it is supposed to test—than projective assessments. If you are a clinical psychologist trying to assess anxiety or depression in a patient, the objective test is more likely than the projective test to measure these conditions accurately. Objective tests also offer greater **reliability,** which is the extent to which a test yields consistent results, regardless of who gives the test or when or where it is being given (Dawes, 1994). Finally, the two types of tests differ in the training required to score them. Scoring or interpreting projective tests requires months, even years, of extensive training, but scoring objective tests is simple and uncomplicated.

The best-known personality inventory has more than 500 questions. It's called the **Minnesota Multiphasic Personality Inventory** (mercifully abbreviated as the **MMPI**), and it is the most widely researched and clinically used of all personality tests. The MMPI was originally developed to identify emotional disorders (still considered its most appropriate use), but this test is now used for many other screening purposes. The second version of the test, the MMPI-2, was standardized on a more diverse sample of people than the original MMPI.

The MMPI-2 assesses test-takers on 10 clinical scales used to diagnose psychological disorders (see **Figure 29.4**). An additional 15 content scales measure all kinds of attributes, including anger, attitude toward work, and whether a person is trying to fake mental illness.

Therapists are not the only people administering the MMPI-2. Many school admissions officers and personnel departments use the MMPI-2 to

validity The extent to which a test measures or predicts what it is supposed to test.

reliability The extent to which a test yields consistent results, regardless of who gives the test or when or where it is given.

Minnesota Multiphasic Personality Inventory (MMPI) The most widely researched and clinically used of all personality tests; originally developed to identify emotional disorders (still considered its most appropriate use), this test is now used for many other screening purposes.

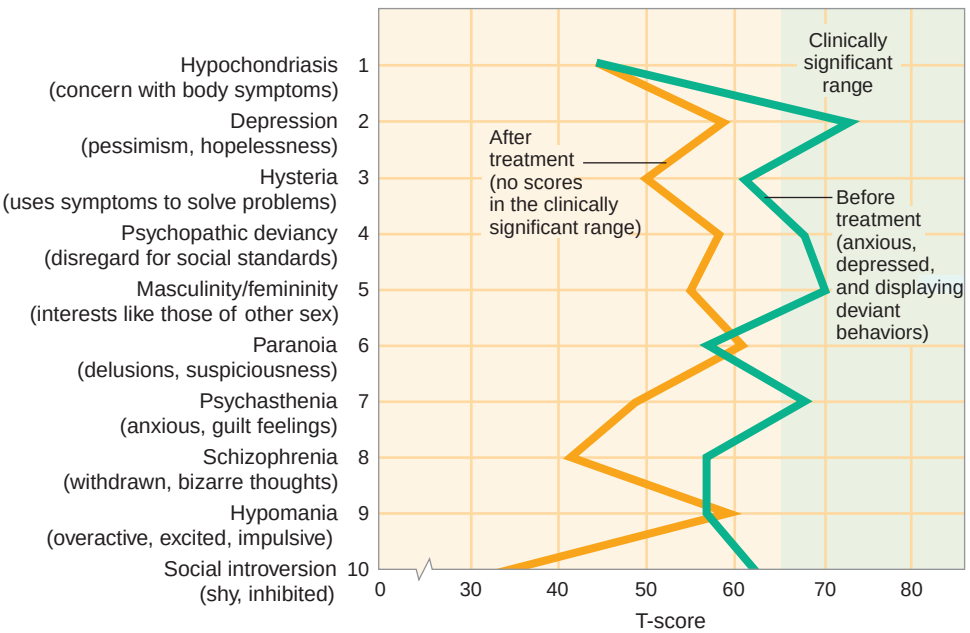

Hypochondriasis (concern with body symptoms) 1
Depression (pessimism, hopelessness) 2
Hysteria (uses symptoms to solve problems) 3
Psychopathic deviancy (disregard for social standards) 4
Masculinity/femininity (interests like those of other sex) 5
Paranoia (delusions, suspiciousness) 6
Psychasthenia (anxious, guilt feelings) 7
Schizophrenia (withdrawn, bizarre thoughts) 8
Hypomania (overactive, excited, impulsive) 9
Social introversion (shy, inhibited) 10
Clinically significant range
After treatment (no scores in the clinically significant range)
Before treatment (anxious, depressed, and displaying deviant behaviors)
0
30
40
50
60
70
80
T-score

Figure 29.4
A Minnesota Multiphasic Personality Inventory Profile

These are the scores of a young man suffering depression and anxiety—before and after treatment for his disorders. An average "T-score" is 50, and scores over 65 suggest a psychological disorder.

assess potential students or employees. Unfortunately, these agencies may be using the test in ways that were not intended (Matarazzo, 1983).

Is it possible to beat the MMPI-2, presenting yourself as something you are not? You bet. Although objective tests have greater validity than projective tests, they aren't always valid. It may be difficult to fake mental illness on the MMPI-2, but it is possible to fake near perfection on some other scales by answering in socially desirable ways. If you were applying for a job and your potential employer gave you a test asking how often you become angry, what would you say? A person with an anger problem who wants a job might say, "Sometimes," or, "Almost never," to look more favorable to the boss.

This anger example hints at a potential problem with self-report data: How honest are we when assessing ourselves? Can you accurately say how helpful you are? Some researchers suggest peer reports are more likely than self-reports to provide valid and reliable information (Funder, 1991, 1995). What if you say you're not helpful but all your friends and relatives rate you high in helpfulness? Chances are, you *are* helpful.

PAUSE NOW OR MOVE ON

Turn to page 530 to review and apply what you've learned.

Evaluating the Trait Perspective

WHAT'S THE POINT?

29-5 What are the strengths and weaknesses of the trait theory of personality?

Interestingly, our traits are often evident in places we might not automatically consider. Research shows your score on a conscientiousness scale can be predicted by a quick, unannounced review of your bedroom or office (Gosling et al., 2002). Personal websites, social media (for example, Facebook), and e-mail can also provide insight into a friend's extraversion and openness to experience (Gill et al., 2006; Gosling et al., 2007).

Understanding personality through traits has at least a couple of faults, however. One criticism of the trait perspective is that it does not consider how important the *situation* is to a particular trait. Do you act the same way in the classroom as you do when you're at lunch with friends? Students seem to vary from classroom to classroom as well. On several occasions, I've had colleagues tell me how quiet or how outgoing a student is, only to see the opposite behavior in my class. Trait behavior seems to be related to where we are and whom we're with (Mischel, 2004).

Trait theories have another glaring weakness: their inability to explain *why* we behave the way we do. Traits may describe us well, but they limit themselves to statements of *how* we behave. Felicia is calm and secure, so we label her as high in emotional stability. Trait theories do not explain why Felicia is calm and secure.

Some theorists are suggesting the possibility of adding dimensions to the Big Five (Ashton et al., 2004). Perhaps in the future we'll have a Big Eight that includes the likes of positive and negative emotion, femininity and masculinity, and religiosity. Time, and research, will tell.

Trait theories also do not consider the effects of our thoughts on our behavior. The social-cognitive perspective, however, has a lot to say about how thoughts and situations affect personality.

PAUSE NOW OR MOVE ON

Turn to page 530 to review and apply what you've learned.

The Social-Cognitive Perspective

WHAT'S THE POINT?

29-6 How do social-cognitive theorists explain the development of our personality and the relationship among personality, the environment, and behavior?

The social-cognitive perspective is an interactive theory that combines research on social behavior, cognition, and learning. Some call this theory the *cognitive social learning theory* or the *cognitive-behavioral approach,* but we stick with the *social-cognitive perspective,* the name used by **Albert Bandura** (1986). Bandura and other social-cognitive theorists contend that we learn by observing and modeling the behaviors of others or by having certain behaviors reinforced or rewarded. Proponents of the social-cognitive perspective believe that to understand personality, we need to consider the situation the person is in, how that person thinks, and how that person interacts socially. (The desire to understand personality—especially our own—can unfortunately lead us astray, as seen in Psychology in the Real World: Planets, Palms, and Personalities.)

ALBERT BANDURA (1925–) Psychologist who developed the social-cognitive perspective and believed that to understand personality one must consider the situation and the person's thoughts before, during, and after an event.

COURTESY ALBERT BANDURA, STANFORD UNIVERSITY

Interacting With Our Environment: Three Influences

A colleague who taught down the hall from me was, by most accounts, a tranquil person. Students described him as "calm" and "gentle." One Saturday afternoon, my daughter's recreational league basketball team played against the team coached by my serene colleague, and I witnessed a completely different person. He looked sternly at his players as they warmed up. He yelled constantly at the teen referee during the game. After the game, he huddled with his players and, in a loud voice, told each what she had done wrong during the game—even though they had won by eight points. What would explain the difference in behavior between teacher and coach?

Psychology in THE REAL WORLD

Planets, Palms, and Personalities

After sending an e-mail with the word *horoscope* in the subject line, I noticed some "sponsored links" beside the responses from my friends that included all kinds of find-your-fate websites. For only $4.95 per month, I could get my dreams analyzed, find out where I am on the "love meter," and have my fortune told. All things considered, this was a cheap price to pay to discover everything about myself and what I should do with my life. One of the links said it would get this "100 percent reliable information" by consulting the position of the stars and planets, and the phase of the moon, after I revealed my birth date. Another encouraged me to send a scan of my palm and a handwriting sample to find out what kind of person I am and how long I will live. Is there anything to these methods? Do these techniques reveal who you are? Psychologists have seriously considered these questions and so far have found no scientific support for psychics' claims.

I'll admit, the other day I read my Capricorn horoscope and agreed with what it said. But that same day I also read Sagittarius, Libra, and Leo and thought those descriptions applied equally well to me! This is not surprising, because few people can pick out their horoscope when all 12 are presented without labels (Carson, 1985; Kelly, 1997). Similar studies have shown handwriting analysis "experts" do no better than chance in predicting people's occupations from their handwriting samples (Beyerstein & Beyerstein, 1992; Dean et al., 1992).

With such a bad track record, how do astrologers and palm readers stay in business? One former palm reader, research psychologist Ray Hyman, provides some insight into their apparently successful techniques (1981). The "seer" often starts by offering generally true statements few of us would disagree with, such as the following:

- "You worry about things more than you let on."
- "I sense you are nursing a grudge against someone; you really ought to let that go."
- "You are adaptable to social situations and your interests are wide ranging."

Any of those sound like you? I was in a class once where we were all given a "personality test" that would provide us with a personal character analysis. The next day, we were all handed our individual analyses, then asked how much we agreed with what had been said. Almost all of us said the character analysis closely described our personalities, and some were amazed at the accuracy. Imagine our surprise when the instructor revealed that we had all received the same analysis, taken at random from an astrology magazine!

"Seers" also pay close attention to your body language, clothing, and physical features. Therapeutic shoes may indicate physical discomfort. Haircut or clothing could indicate music preference. Facial expressions can indicate mood. Expensive jewelry? Wealth. After sizing you up, the seer may then say something like "I can tell you're dealing with a problem, and that you are not sure what to do about it." This sympathy technique builds trust. If the person seeking insight gives a positive nod in response, the seer will reassert the statement more strongly. Seers are also good at deflecting negative responses. If the statement seems inaccurate, you will just have to work harder to make sense of the "vision" or message.

The bottom line is that we should all beware of those who use these techniques. Reading your horoscope and chuckling at the generalized statements is one thing. But planning your life around them is definitely not a good idea.

Social-cognitive theorists would likely explain that my colleague's behavior differences were caused by **reciprocal determinism,** the mutual influences between personality and environmental factors (Bandura, 1986, 2006). Reciprocal determinism includes the interaction of three factors:

1. Your thoughts or cognitions
2. Your environment
3. Your behaviors

reciprocal determinism The mutual influences between personality and environmental factors.

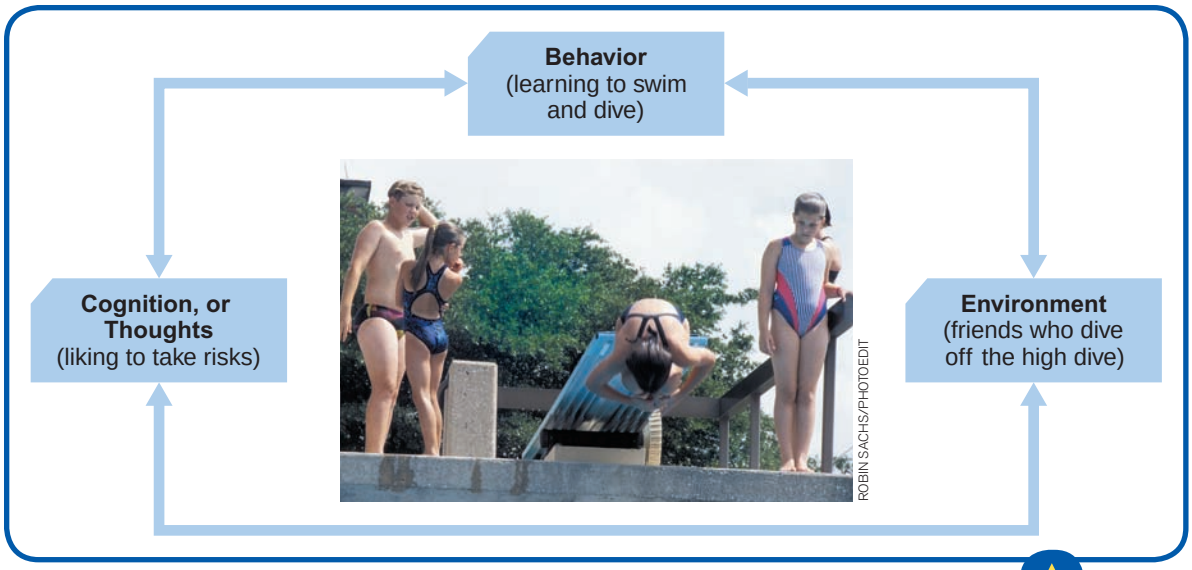


Figure 29.5
Reciprocal Determinism

Albert Bandura's social-cognitive perspective suggests that personalities are shaped by the interaction of environment, behaviors, and thoughts (cognitions).

Each factor interacts with the others (see **Figure 29.5**), according to social-cognitive theorists, in determining your personality. To understand the teacher/coach's changing personality, we would then need to consider the following questions:

- *How does his behavior change in different situations?* Does he act the same way at home as he does on the basketball court, or is his home behavior more like his classroom behavior? Would he have been calmer if the referee had been an adult?
- *How does he perceive each situation?* Is he more confident in the classroom, and thus more in control? Is coaching so overwhelming that he loses track of his emotions? Did he sense weakness in the 14-year-old referee and alter his approach to the game?
- *How do the elements of the situation affect his behavior?* Do parents breathe down his neck, demanding a victory? Had this same referee called a poor game the week before?

We can't expect to know a person's personality by observing that individual in one situation or at one point in time. All behavior is the result of the interplay between external (environment) and internal (thoughts, perceptions) factors.

Personal Control

Do you feel as though your environment controls you, or do you believe you are in control of your environment? Social-cognitive psychologists who study personal control believe that the way you answer this question can provide clues to your personality. Psychologists who study personality from this perspective are especially interested in two questions:

1. How do feelings of control predict achievement and behavior?
2. How does explanatory style affect our well-being?

external locus of control The perception that chance, or forces beyond your control, determines your fate.

internal locus of control The perception that you control your own fate.

Locus of Control

Consider the following statements:

- There's no reason to vote in an election—your vote doesn't really count.
- When you try to get a job, it's not *what* you know that matters but *whom* you know.
- One person can make a difference in the way elected representatives think.
- If you want to be a success, depend on hard work, not luck.

Which two are closest to what you believe? For a social-cognitive psychologist, these four statements are clues to your *locus of control.* (*Locus* is from a Latin word meaning "place.") The first two reflect what Julian Rotter called an **external locus of control,** the perception that chance, or forces outside yourself and beyond your control, determines your fate. If you feel more comfortable with the second two statements, you probably have an **internal locus of control,** the perception that you control your own fate. Dozens of studies have compared how an external or internal locus of control correlates with behavior and achievement. Look at these results. Compared with externals, people with an internal locus of control

- are less depressed (Presson & Benassi, 1996).
- are more likely to be healthy (Lachman & Weaver, 1998).
- achieve more in school and act more independently (Lefcourt, 1982; Ng et al., 2006).
- cope better with stress, including serious stressors like marital problems (Miller et al., 1986).

Good news for internals, but not for externals. If you have an external locus of control, is it possible to change? Researchers today are working on that very question, which we explore in our next section.

Internal Versus External Control

People with an internal locus of control—the perception that you control your own fate—are healthier, cope better with stress, and are less likely to be depressed, compared with people with an external locus of control, who attribute their fate to chance or other outside forces.

JOOS MIND/GETTY IMAGES

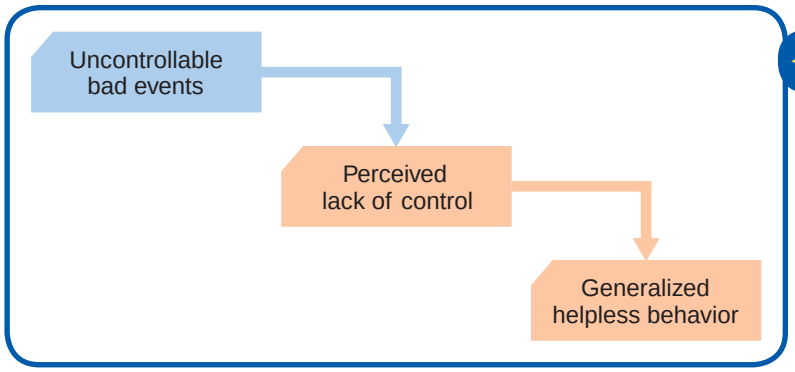


Figure 29.6
Learned Helplessness

People and animals are likely to learn helplessness when they repeatedly experience bad events over which they have no control.

Learned Helplessness and Learned Optimism

Researcher Ellen Langer (1983) once said, "Perceived control is basic to human functioning." Indeed, depressed people often feel a lack of control (Seligman, 1975, 1991). People or animals who feel hopeless when they can't avoid repeated bad events tend to develop **learned helplessness.** In a landmark study, **Martin Seligman** (1975) demonstrated the development of learned helplessness in dogs that had no control over negative events. The researchers placed one group of dogs in individual cages divided by a low barrier. These dogs received an electric shock, but they could jump over the barrier to the other side of the cage to escape the shock. A second group of dogs, in similar cages, received the same shocks, but they were restrained in harnesses that prevented escape. After several trials in which shocks were administered but escape was impossible, the researchers removed the harnesses. Sadly, the dogs in this second group did not even attempt to escape from the shocks, even though they could now easily jump over the barrier to the other side of the cage. Instead, most cowered on the cage floor. The dogs had developed a sense that they had no control over their environment. They had learned helplessness (see **Figure 29.6**).

People learn helplessness, too. Depression and hopelessness emerge in people who face traumatic events over which they have no control. However, several studies show that morale and health can be boosted by giving people control where they had none before, such as control of the television in a prison or control over the arrangement of personal belongings in a nursing home (Rodin, 1986; Ruback et al., 1986). And according to one study (Inglehart, 1990, 2009), those living in a stable democracy, where empowerment and personal freedom are more likely, report higher levels of happiness.

After demonstrating learned helplessness, Seligman wondered if optimism could also be learned. His interests led him to found **positive psychology,** a movement that studies optimal human functioning and the factors that allow individuals and communities to thrive. Could an optimistic attitude be one of those factors? Let's see what Seligman and others have discovered. (For more on Seligman, see Thinking About Positive Psychology: Learned Helplessness's Other Side—Some Dogs Never Gave Up.)

Each of us has, to some degree, an optimistic or pessimistic *explanatory style.* If you have an optimistic style and something goes wrong, you are more likely to explain the problem as temporary, not your fault, and something that will not spread beyond present circumstances. In contrast, those with a pessimistic explanatory style tend to blame themselves, make the

COURTESY OF MARTIN E. P. SELIGMAN, PH.D. DIRECTOR, POSITIVE PSYCHOLOGY CENTER/UNIVERSITY OF PENNSYLVANIA

MARTIN SELIGMAN (1942–) American psychologist who researched helplessness early in his career before turning his interest to optimism; he has been the primary proponent of positive psychology.

learned helplessness The hopeless feeling when an animal or human can't avoid repeated bad events.

positive psychology A movement in psychology that focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive.

Thinking About POSITIVE PSYCHOLOGY

Learned Helplessness's Other Side—Some Dogs Never Gave Up

I had the chance to talk with Martin Seligman, one of positive psychology's founders. At one point a tone of sadness crept into his voice. "When I talk to teachers, the first question I usually get is about learned helplessness, how we taught dogs to give up in a seemingly helpless situation. The fact is, I was always more interested in the dogs that never quit." Indeed, some of the dogs, no matter what the conditions, never quit trying to avoid or escape the shocks delivered during the learned helplessness experiments. Interest in these animals played a key role in Seligman's shift away from the study of helplessness.

Seligman wrote *Learned Optimism* in 1991, which laid the groundwork for his research on human strengths and well-being. Seven years later, in the biggest landslide in the American Psychological Association's hundred-year history, Seligman was elected president of APA.

Martin Seligman's 1998 APA presidential address kick-started the positive psychology movement, which focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive. In that address, Seligman reminded psychologists of the field's three distinct missions in the years before World War II (1999):

1. Curing mental illness
2. Making life more productive and fulfilling
3. Identifying and nurturing high talent

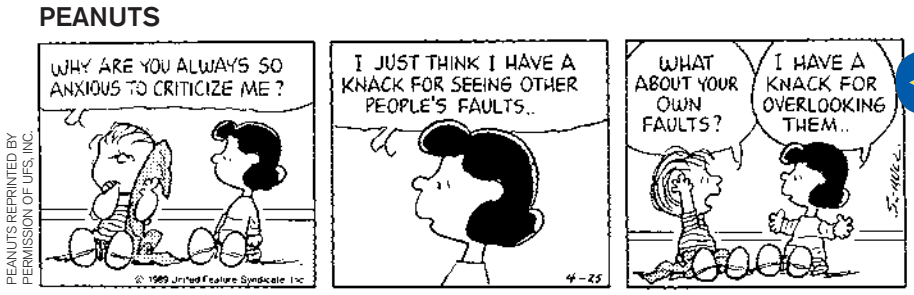
According to Seligman, by the end of the twentieth century, psychology had lost track of the second and third missions. Seligman and many others have called for a return to the other two "distinct missions" of psychology. He suggests moving from a preoccupation with *repairing* the worst things in life to *building* on positive qualities. Seligman writes (Seligman & Csikszentmihalyi, 2000, p. 5),

> The field of positive psychology . . . is about positive individual traits: the capacity for love and vocation, courage, interpersonal skill, perseverance, forgiveness, originality, future mindedness, spirituality, high talent, and wisdom. At the group level, it is about civic virtues and the institutions that move individuals toward better citizenship: responsibility, nurturance, altruism, moderation, tolerance, and work ethic.

Some say the topics addressed by positive psychologists resemble the topics humanistic psychologists discussed 40 years ago. A major difference between the two is that Seligman sees *research* as positive psychology's "protector and shield," guarding against the unscientific self-help techniques that grew out of humanistic psychology's great promise. Positive psychologists often encourage people to discover and build on their "signature strengths," which can be assessed by taking one of several online tests endorsed by Seligman and other positive psychologists (see, for example, the tests at www.authentichappiness.org).

event a catastrophe, and see the problem as something beyond their control. Researchers have found a link between pessimistic style and an external locus of control. Pessimists also are more likely than optimists to receive bad grades, experience depression, and have a shorter life span because of poorer health (Seligman, 1994, 2002).

Fortunately, Seligman has found that pessimists can work to overcome this deficit in their outlook. One successful method is disputing pessimistic thoughts (Reivich, 2010). Arguing with ourselves about pessimistic beliefs can turn dejection into optimism. Negative thoughts are often unfounded. Coming to terms with this can help us distance ourselves from pessimism's destructiveness. We also need to check for evidence that disproves pessimistic


PEANUTS
WHY ARE YOU ALWAYS SO ANXIOUS TO CRITICIZE ME?
I JUST THINK I HAVE A KNACK FOR SEEING OTHER PEOPLE'S FAULTS..
WHAT ABOUT YOUR OWN FAULTS?
I HAVE A KNACK FOR OVERLOOKING THEM..
PEANUTS REPRINTED BY PERMISSION OF UFS, INC.

Optimist or Pessimist?

Some may go a bit too far, but being able to overlook your faults can help you cope better with everyday stress.

beliefs and consider alternative explanations for bad events. That is, if you fail a test, look for reasons to disprove the thought that "I'm stupid." Perhaps you'd earn a better grade if you were able to get more sleep, had studied better, or went in after school to ask the teacher for help. Finally, it's important not to generalize too much from a bad situation. After a bad test score, don't think, "I'm a stupid idiot and I'll never do well." Instead, think, "I didn't do well on this particular test because I didn't study hard enough." Note the alternative explanation provided in the second answer, which gives the test-taker a more hopeful approach. (Study harder and do better next time.)

There are advantages to adjusting your thinking from pessimistic to optimistic, but can you have too much optimism? *Yes.* One researcher notes that an unrealistic optimism is a common bias among optimistic thinkers (Weinstein, 1980, 1982, 1996). Optimism in its worst form may lead to a false sense of invincibility. For instance, optimistic, sexually active college women believe they are less likely to become pregnant than their pessimistic counterparts (Burger & Burns, 1988). And perhaps too much optimism is a factor for those who enter into and maintain ill-fated relationships, even though they are well aware of the United States' one-in-every-two divorce rate. Aristotle's observation—"Nothing in excess"—applies to optimism as well as to pessimism.

Assessing Behavior in Situations

Social-cognitive theorists believe there are better ways to assess a person's personality than the trait theorists' multiple-choice personality inventory (Mischel, 1981). They prefer experiments that study how differing situations affect people's attitudes and behavior. Do you want to know whether children will be more aggressive with their peers after observing televised boxing? Or whether children will help one another more after watching a *Mister Rogers' Neighborhood* program on helpfulness? Social-cognitive psychologists say that the way to know such things is to run an experiment: Vary the situation and look for personality consistencies across similar situations.

In another kind of assessment, social-cognitive psychologists look at a person's past behavior patterns to predict the person's future behavior (Ouellette & Wood, 1998; Schmidt & Hunter, 1998). If the person and the situation remain the same, the best predictor of future behaviors is previous actions. The classmate most likely to drink beer at a party is the classmate who drank beer at the last party. The teacher most likely to turn back papers the day after picking them up is the teacher who handed them back the next day on the

last set of papers. Schools that train teachers know that student teaching is a way of putting prospective teachers in real teaching situations to gather data for predicting how they will perform in the future. Similarly, if you live in a city of 50,000 or more people, your community probably has an assessment center for evaluating firefighters and police officers (Lowry, 1997). An assessment simulating actual conditions—of teaching, policing, or some other set of behaviors—is second only to assessing behavior under the demands of the real task.

PAUSE NOW OR MOVE ON

Turn to page 530 to review and apply what you've learned.

Evaluating the Social-Cognitive Perspective

WHAT'S THE POINT?

29-7 What are the strengths and weaknesses of the social-cognitive theory of personality?

The social-cognitive approach draws upon cognition and learning research for its conclusions (Mischel, 1993). Its objective, scientific approach to understanding personality makes it an attractive perspective. It has also sensitized researchers to the importance of considering the situation in the assessment of personality.

But wait a minute. Are we merely a product of what we learn? Are we stimulus-response creatures who act a certain way, based on the rewards and punishments we receive? Even if situations do guide our behavior, what role does emotion play? What effects do our unseen motives, such as revenge or greed, have on our behavior? Furthermore, are there consistent traits, such as shyness or openness, that become lost in social-cognitive explanations of behavior?

While the experts continue to seek answers to personality's questions, one fact appears indisputable: We can view personality from several perspectives, and each perspective fills in a piece of the puzzle that is personality. The trait and social-cognitive perspectives on personality have strengths and weaknesses, but each helps us understand human behavior. Like so many other parts of psychology—and human life—personality is best understood if we view it from multiple perspectives.

PAUSE NOW OR MOVE ON

Turn to page 530 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 29

Thinking About Trait and Social-Cognitive Perspectives on Personality

The Trait Perspective

WHAT'S THE POINT?

29-1 Are there different personality types? If so, how do trait theorists suggest that we describe and measure them?

- Trait theory psychologists think there are different types (or dimensions) of personality that can be described and measured.
- Trait theorists use descriptive techniques to classify personality, identifying characteristic and consistent patterns of behavior.

Apply What You Know

1. What do we call aspects of personality that are pretty consistent?
2. What do we call an individual's characteristic pattern of thinking, feeling, and acting?

Identifying Traits

WHAT'S THE POINT?

29-2 How did psychologists Gordon Allport, Raymond Cattell, and Hans Eysenck identify traits?

- Allport resisted the idea of a "personality law" that would apply to everyone, believing that individual personalities are unique. However, he identified several kinds of traits, which paved the way for other trait theory researchers.
- Cattell used factor analysis to compute the relationships among traits until he came up with 16 core personality dimensions, or factors.
- Eysenck used factor analysis to determine dimensions of personality, including the extraversion–introversion dimension and the emotional stability–instability dimension.

Apply What You Know

3. Which best describes how Cattell developed his list of 16 personality traits?
   a. factor analysis to compute the relationships among traits
   b. analysis of patients' unconscious minds and projective tests of personality
   c. experiments to study the relationship between environmental situations and personality factors
   d. focus on individual uniqueness like Gordon Allport
4. According to Eysenck, how outgoing we are is most determined by
   a. what situations we were exposed to.
   b. our genetics and biology.
   c. the parenting style we grew up with.
   d. the role of the unconscious in healthy people.

The "Big Five" Traits

WHAT'S THE POINT?

29-3 What are the dimensions of the "Big Five" trait theory?

- Current theorists describe at least five distinct dimensions of personality (the Big Five) and assess these dimensions using objective personality inventories. These five dimensions (conscientiousness, agreeableness, neuroticism, openness, and extraversion) appear to be stable in adults.
- Genetic predispositions influence personality traits.
- The Big Five traits also predict other personal attributes, such as marital satisfaction.

Apply What You Know

5. Which of the Big Five personality traits would most influence whether a person feels comfortable telling a joke in front of a group of strangers?
   a. extraversion
   b. neuroticism
   c. openness
   d. conscientiousness
6. Which statement is a key research finding about the Big Five personality traits?

a. The traits match up with those of historical personality trait theories.
b. The traits affect the preconscious mind.
c. The traits interact in important ways in different social situations.
d. The traits appear to be stable in adults.

Testing for Traits

WHAT'S THE POINT?

29-4 How do trait theorists assess personality?

- Trait theorists assess personality through objective personality inventories.
- The Minnesota Multiphasic Personality Inventory (MMPI) uses 10 clinical scales to diagnose psychological disorders and 15 content scales to measure all kinds of attributes, including anger, attitude toward work, and whether a person could be trying to fake mental illness.

Apply What You Know

7. Which statement reveals an important difference between objective and projective tests?
   a. Objective tests are more personal and reveal deeper issues than projective tests.
   b. Objective tests reveal issues that are more important to patients.
   c. Objective tests show greater validity and reliability than projective tests.
   d. Objective tests are valid, but only projective tests are reliable.
8. A personality test that shows the same results each time you take it but whose results do not match your personality has high _____ but low _____.
   a. objectivity; projectivity
   b. optimism; pessimism
   c. reliability; validity
   d. validity; reliability

Evaluating the Trait Perspective

WHAT'S THE POINT?

29-5 What are the strengths and weaknesses of the trait theory of personality?

- Trait theory describes elements of personality in detail but does not address how important situations are to particular traits or try to explain why we behave the way we do.

Apply What You Know

9. Which statement is the most valid criticism of the trait theory of personality?
   a. Trait theory does not help explain why we behave in the ways we do.
   b. Trait theory is based on patient reports, not objective scientific research.
   c. Trait theory does not state a particular number of traits.
   d. Trait theory is based on psychologists' interpretations of projective tests.
10. One problem with trait theory is that it often fails to account for the power of the _____ when addressing an individual's motivation.

The Social-Cognitive Perspective

WHAT'S THE POINT?

29-6 How do social-cognitive theorists explain the development of our personality and the relationship among personality, the environment, and behavior?

- Social-cognitive theorists describe how our personality and behaviors result from interactions among the ways we think, our environment, and our behaviors. To truly describe personality, we need to consider not just personality traits but also how our environment affects the ways we think, and vice versa.
- Albert Bandura and other social-cognitive theorists believe we learn by observing and modeling the behaviors of others or by having certain behaviors reinforced or rewarded.
- Martin Seligman described learned helplessness, the feeling of hopelessness we experience when our actions have no effect on the bad events happening to us.
- Social-cognitive theorists use experiments to study how different situations affect people's attitudes and behavior.

Apply What You Know

11. A person with an external locus of control who gets an F in math is likely to say,
    a. "I wish I liked math more."
    b. "Teachers just don't like me, so I never pass those kinds of classes."
    c. "If I had studied harder, I bet I would have passed."
    d. "Next time I take a class like that, I'll know how to do better on the tests."
12. What do we call the perception that chance, or forces beyond our control, determines our fate?

Evaluating the Social-Cognitive Perspective

WHAT'S THE POINT?

29-7 What are the strengths and weaknesses of the social-cognitive theory of personality?

- The social-cognitive approach sensitized researchers to the importance of the situation in the assessment of personality, but the approach does not consider how emotions may affect behavior and may underemphasize the effect of enduring personality traits.

Apply What You Know

13. Which is least likely to be addressed in a social-cognitive study on personality?
    a. the emotional state of the person
    b. the power of the situation
    c. what the person is thinking while in a situation
    d. how a person behaves
14. The main difference between the trait and social-cognitive theories of personality is that the latter
    a. is based on statistical analysis, rather than personal stories and self-reports.
    b. is a historical theory and trait theory is a more current perspective.
    c. is negative about human nature and trait theory is more optimistic.
    d. focuses on the interaction among personality traits, thinking, and the environment.

KEY TERMS AND KEY PEOPLE

traits, p. 513
personality, p. 513
social-cognitive perspective, p. 513
personality inventories, p. 518
validity, p. 519
reliability, p. 519
Minnesota Multiphasic Personality Inventory (MMPI), p. 519
reciprocal determinism, p. 522
external locus of control, p. 524
internal locus of control, p. 524
learned helplessness, p. 525
positive psychology, p. 525
Gordon Allport (1897–1967), p. 515
Raymond Cattell [kuh-TELL] (1905–1998), p. 515
Hans Eysenck [EYE-zink] (1916–1997), p. 516
Albert Bandura (1925–), p. 521
Martin Seligman (1942–), p. 525

Psychological Disorders

MODULES

30 Introduction to Psychological Disorders

31 Anxiety and Mood Disorders

32 Dissociative, Schizophrenic, and Personality Disorders

Perhaps you've been surprised at some topics you've studied so far in your psychology course—many people don't realize how broad the science of mind and behavior really is. The modules to come, however, cover a topic you almost certainly expected to find in this class—psychological disorders. There are many types of psychological disorders, just as there are many types of physical ailments. Some psychological disorders, such as depression, are relatively common; others, such as multiple personality disorder, are rare and controversial. Many psychological disorders involve common symptoms (such as anxiety) that you can probably relate to personally. But others have symptoms you are not likely to have experienced, such as the bizarre hallucinations that sometimes accompany schizophrenia.

Psychologists and other therapists group psychological disorders into broad, related categories. In the next three modules, we explore general issues related to psychological disorders and then turn our attention to some of their major categories. If you or someone you know has struggled with one of these psychological disorders, then you know that they can be devastating and frightening. Psychological science is gradually shedding welcome light on the nature of these problems, and this light is showing us the path to more effective treatments. As we learn more, we are better able to address these psychological disturbances of the human condition and to understand the suffering of those afflicted, their families, and their friends.

MODULE 30

Introduction to Psychological Disorders

Defining Disorder

Understanding Disorders

- The Medical Model
- The Bio-Psycho-Social Model

Classifying Disorders

Labeling Disorders

Psychologists specializing in psychological disorders try to unlock the secrets behind harmful thoughts, feelings, and behaviors. Let's take a closer look at attempts to understand and classify disorder.

Observing people's strange-seeming behaviors, we may wonder what is going on inside their heads. Consider the following behaviors and then decide whether you think they are evidence of a psychological disorder:

1. A man walks up to a window, through which no one can see him, carrying a chair. He puts down the chair, opens the window, takes off his clothes, and seats himself on the chair. Why? He says he feels the need for an "air bath."
2. Every morning, a woman who lives in a New York City suburb asks her husband to bring in the morning newspaper, which the carrier throws just inside their fence. She does this because she is terribly afraid of encountering a poisonous snake. Her husband, concerned about her behavior, repeatedly tells her that no poisonous snakes have been seen in their area for over 30 years. Nevertheless, she is afraid to leave the house.

Native American Rituals

This vision quest and other rituals are common among many native nations and are not considered maladaptive, unjustifiable, disturbing, or atypical.

MARILYN ANGEL WYNN/NATIVESTOCK PICTURE/CORBIS

3. A teenage boy packs a blanket and some water. Ignoring near-freezing temperatures, he climbs a nearby mountain, spreads the blanket on the ground, sits cross-legged on it, closes his eyes, and remains there throughout the night. In the morning, he runs home and tells his father he has seen a vision.
4. A teenage girl misses school for three days. She periodically breaks into tears. She finds it nearly impossible to get out of bed in the morning, although she cannot sleep for more than an hour or two at a time. She has no appetite and becomes nauseated if people urge her to eat.

Most people would say these behaviors are out of the ordinary—perhaps even puzzling or disturbing. But are they so abnormal that we can attribute them to a psychological disorder? Before attempting to answer that question, we must first decide what *psychological disorder* means. Let's see how psychologists define this term.

Defining Disorder

WHAT'S THE POINT?

30-1 How do psychologists define what kind of behavior is diagnosed as a psychological disorder?

Psychologists define a **psychological disorder** as a harmful dysfunction in which thoughts, feelings, or behaviors are maladaptive, unjustifiable, disturbing, and atypical (Wakefield, 1997, 2006). Consider each of these terms:

- *Maladaptive: destructive to oneself or others.* The behavior of the woman whose fear of snakes prevented her from leaving her home is maladaptive. In some cases, fear of poisonous snakes is a wise and practical response: If bitten, you could die from their deadly venom. But the woman's extreme fear is destructive to her because it keeps her from leading a normal life. As you can see, maladaptive behaviors are sometimes—although not always—an exaggeration of normal, acceptable behavior. The behavior of the teenage girl may also be maladaptive. She is showing some classic symptoms of depression—an inability

psychological disorder A harmful dysfunction in which thoughts, feelings, or behaviors are maladaptive, unjustifiable, disturbing, and atypical.

to sleep, eat, or function normally. And what about the teenage boy who sat on a blanket all night in near-freezing temperatures? This behavior seems self-destructive, too. Finally, what can we say about the man who sat naked to take an air bath? His behavior may seem strange, but he wasn't doing anything that could be considered destructive to himself or others (since no one else could see him naked), so we can't classify his behavior as maladaptive.

HANS DERYK/AP/WIDE WORLD PHOTOS

Disordered?

This rabid sports fan may behave in an atypical way, but psychologists would not label him disordered because his behavior is not maladaptive, unjustifiable, or disturbing (except to the other team's players).

- *Unjustifiable: without a rational basis.* Here again, the behavior of the woman with the extreme fear of snakes qualifies as unjustifiable. It is not rational to refuse to leave your home to avoid a snakebite in an urban area that has no poisonous snakes. But the teenage girl with symptoms of depression? What if I tell you that her entire family died three days ago, when her home was destroyed by fire? Suddenly, her inability to sleep, eat, or function seems understandable: These behaviors have a rational basis. And the young man who sat on the blanket all night? What if I tell you that he was a young member of the Santee Sioux nation, living in South Dakota in 1920, and a vision quest was part of his spirituality? In this case, too, the behavior seems quite rational, at least to other members of his culture and others with knowledge of it. But surely, you say, the man taking the air bath was performing an act with no rational base. Not so. That man was Benjamin Franklin, signer of the Constitution and one of our country's greatest philosophers and thinkers. His "air bath" was an accepted practice in his day and, in that context, was not unjustifiable.
- *Disturbing: troublesome to other people.* This criterion is fairly easy to score for all four individuals. The woman's fear of snakes disturbs at least her husband, who worries about her. The young girl's reaction to her loss probably disturbs people concerned about her. The young American Indian's vision quest probably pleased his parents and other relatives. Benjamin Franklin's air bath, which was unobserved by others, did not disturb anyone.
- *Atypical: so different that it violates a norm.* Notice that this definition has two parts, and they are equally important: The behavior is not like other people's behaviors (so different), and it violates a *norm*—a rule for accepted and expected behavior in a particular culture. In terms of defining psychological disorders, it doesn't matter if my behavior is unlike yours if we live in *different* cultures; it only matters whether people in *my* culture think my behavior is abnormal. So, look again at the four examples. The woman who can't leave her suburban home because of her fear of

Too Happy?

In reality, few would cite happiness as a psychological disorder in need of treatment.

© 1992 BY SIDNEY HARRIS.

"I'm always like this, and my family was wondering if you could prescribe a mild depressant."

nonexistent snakes is definitely behaving differently from almost all people in her culture. The grief-stricken girl is behaving in a way that most people in her culture would consider within the typical range for someone who had recently suffered such a loss. The young man who had a vision is behaving in a way that Santee culture would consider acceptable and typical for males his age. And Benjamin Franklin was bathing in a way that we may consider strange three centuries later but that his eighteenth-century friends would have found unexceptional.

So, how many of these people meet the four criteria for having a psychological disorder? Only one: the woman with the extreme fear of snakes. As these examples illustrate, a behavior may be maladaptive or unjustifiable or disturbing or atypical. But to be judged part of a psychological disorder, it has to meet all four of these criteria. (If you have trouble remembering these four points, try my memory trick: Form a "word"—*MUDA*—from the first letter of each point [maladaptive, unjustifiable, disturbing, and atypical].)

Now that we have some agreement on what we mean by *psychological disorder,* we can look at how psychologists attempt to understand and classify these disorders.

PAUSE NOW OR MOVE ON

Turn to page 547 to review and apply what you've learned.

Understanding Disorders

WHAT'S THE POINT?

30-2 Historically, what were considered the causes of psychological disorders, and what are the current perspectives?

Perspectives on psychological disorders have changed through the centuries. Written records of attempts to understand abnormal behavior go back at least 4000 years (Brems et al., 1991). Ancient Babylonians viewed disorders as the result of demonic possession and treated them with prayer and magic. Ancient Hebrews saw psychological disorders as punishment for sin, and they, too, looked to religion for a cure. Socrates and other ancient Greek philosophers blamed faulty thought processes for psychological disorders and believed in the healing power of words. All three cultures used humane treatment methods (Schultz & Schultz, 2008).

Unfortunately, not all approaches to treatment have been humane. Fifteenth-century Europeans suspected that people showing symptoms of psychological disorders were possessed by demons, and they often tortured or executed the sufferers to oust these bad spirits. By the eighteenth century, conditions had improved (at least the executions had stopped), but people with mental illnesses were often chained and locked up in filthy

BETTMANN/CORBIS

Understanding Disorders

Philippe Pinel, here depicted unchaining inmates at a Paris asylum, and other reformers promoted the humane treatment of those with mental disorders.

institutions or displayed like zoo animals. Humane treatment was rare—at least until French physician **Philippe Pinel** and other reformers worked to eliminate this institutionalized brutality. Pinel and others helped change Europe's view of psychological disorders. Dorothea Dix worked for similar goals in North America.

THE GRANGER COLLECTION, NEW YORK/THE GRANGER COLLECTION

PHILIPPE PINEL (1745–1826) French physician who worked to reform the treatment of people with mental disorders.

The Medical Model

Pinel saw psychological disorders as sickness, not demonic possession. Pinel favored talking to patients, treating them gently, and providing clean living conditions. Still, the question lingered: If psychological disorders resulted from sickness, what caused the sickness?

This question was particularly pointed in the 1800s, because medical researchers had recently discovered the brain-damaging and mind-altering syphilis germ. If the dementia that accompanies syphilis had a physical cause, might it be that *all* mental disorders could be traced to diseases of the body? This question led to the **medical model** of mental illness—the concept that mental diseases have physical causes that can be diagnosed, treated, and in most cases, cured. The reforms started by Pinel and others like him, combined with the new medical model, replaced the ugliness of asylums and torture with the humaneness of hospitals and therapy.

The medical model is alive and well today. Contemporary research has uncovered physical causes, both genetic and biochemical, for symptoms of some of the more troubling psychological disorders, including *schizophrenia,* a group of severe disorders characterized by disturbed thinking, perceiving, feeling, and acting. This new level of understanding has led to new, medical treatments, often involving drug therapy. But the medical model has not always led to the miracle cures some health workers hoped for. In its quest to find physiological explanations for mental diseases, the medical model focuses almost exclusively on nature and almost never on nurture. By failing to consider environment or culture, the medical model overlooks the influence of such factors as stress, upbringing, and personal history. Another approach, the bio-psycho-social model, offers a more inclusive view of the causes of psychological disorders.

medical model The concept that mental diseases have physical causes that can be diagnosed, treated, and in most cases, cured.

bio-psycho-social model A contemporary perspective that assumes biological, psychological, and social factors combine and interact to produce psychological disorders.

The Bio-Psycho-Social Model

Psychologists who use the **bio-psycho-social model** (see **Figure 30.1**) study how biological, psychological, and social factors combine and interact to produce psychological disorders. The bio-psycho-social approach studies both nature *and* nurture, and it focuses on their interaction.

The bio-psycho-social model agrees with the medical model that there is a biological component to psychological disorders, but it views it as one leg of a three-legged stool. The biological component includes your genetic *predisposition,* or hereditary susceptibility to a disorder. Genetic predisposition may help explain why some young people endure breakups with a boyfriend or girlfriend without becoming too depressed, but others become so sad that they can't go to school. The second group of students may have a greater genetic predisposition to depression than the first group.

The psychological component of the bio-psycho-social model includes our thoughts or thinking patterns. In the breakup example, these two groups of students may differ in the way they explain the breakup to themselves. The first group, for example, may explain things in terms of the situation ("I'll really miss being with her [or him], but we're going to be 200 miles apart this summer, and it wouldn't have worked"). Perhaps the second group explains bad events by defining them as examples of permanent faults ("I'm stupid and ugly and I always say the wrong thing; it's all my fault"). If so, they are more likely to feel bad about the breakup. How you think about an event can shape your feelings and your actions.

Finally, there is the social component of the bio-psycho-social model. Perhaps the students in the two groups had different expectations about the relationships. If the first group of students saw the breakup as the end of a casual

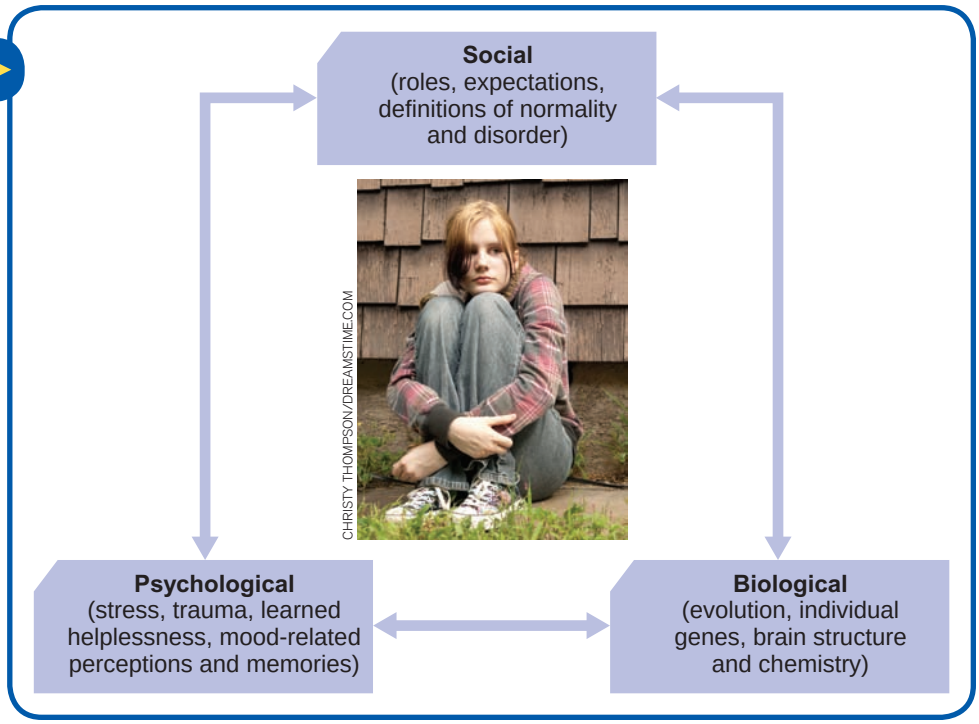


Figure 30.1
The Bio-Psycho-Social Model

Most psychologists today believe that biological, psychological, and social factors interact to produce mental disorders.

dating arrangement, it might not seem so serious. But if the second group of students saw the breakup as the end of a long-term and permanent bond, they might react more intensely.

Social and cultural beliefs can affect even the behaviors and beliefs characterizing psychological disorders. Most people your age have heard of *anorexia nervosa,* an eating disorder in which a person becomes significantly underweight but continues to diet. This disease appears to be a largely Western phenomenon: In countries where food is scarce, no term for this disease exists. Now, have you ever heard of *susto?* Probably not. Few people in the United States have ever been diagnosed with, or even heard of, *susto*. But residents of certain Latin American countries are very much aware of this psychological disorder. They know that *susto* is characterized by a fear of black magic, resulting in extreme restlessness and severe anxiety. As these examples illustrate, cultures have their own unique sources of stress, leading to their own unique disorders (Beardsley, 1994; Castillo, 1997).

The bio-psycho-social model reminds us that to understand and classify psychological disorders, we need to account for the interaction of physiological, psychological, and sociocultural forces, all of which help shape our behaviors.

PAUSE NOW OR MOVE ON

Turn to page 547 to review and apply what you've learned.

Classifying Disorders

WHAT'S THE POINT?

30-3 How do psychologists categorize the different psychological disorders?

All sciences classify information to create a sense of order within the discipline. Chemistry classifies elements to keep track of atomic weight and the number of electrons orbiting the nucleus. Biology classifies living things into categories, telling us, for example, whether animals are hatched or born live, cold-blooded or warm-blooded. Clinical psychologists and psychiatrists (physicians who treat psychological disorders) classify psychological disorders according to their symptoms to do the following:

1. Describe the disorder
2. Predict the future course of the disorder
3. Treat the disorder appropriately
4. Provide a springboard for research into the disorder's causes

The American Psychiatric Association developed the most accepted and widely used classification system for psychological disorders. This publication, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), is in its fourth edition and had a text revision, hence its nickname, **DSM-IV-TR.** A

DSM-IV-TR The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision; a widely used system for classifying psychological disorders.

significantly revised edition, the DSM-5, is scheduled to be released in 2013 (American Psychiatric Association, 2010). The DSM-IV-TR also has a practical application: U.S. insurance companies require a DSM-IV-TR classification before they will cover therapy for a disorder.

The DSM-IV-TR defines a diagnostic process and divides mental disorders into 16 clinical syndromes (see **Table 30.1**), with descriptions and estimates of the number of people who have each disorder. It does not list possible causes of psychological disorders. The manual is subject to change and revision.

Table 30.1

How Are Psychological Disorders Diagnosed?

Based on assessments, interviews, and observations, many clinicians diagnose by answering the following questions from the five levels, or axes, of the DSM-IV-TR.

Axis I Is a *Clinical Syndrome* present?

Using specifically defined criteria, clinicians may select none, one, or more syndromes from the following list:

- Disorders usually first diagnosed in infancy, childhood, and adolescence
- Delirium, dementia, amnesia, and other cognitive disorders
- Mental disorders due to a general medical condition
- Substance-related disorders
- Schizophrenia and other psychotic disorders
- Mood disorders
- Anxiety disorders
- Somatoform disorders
- Factitious disorders (intentionally faked)
- Dissociative disorders
- Eating disorders
- Sexual disorders and gender identity disorder
- Sleep disorders
- Impulse-control disorders not classified elsewhere
- Adjustment disorders
- Other conditions that may be a focus of clinical attention

Axis II Is a *Personality Disorder or Mental Retardation [Intellectual Disability]* present?

Clinicians may or may not also select one of these two conditions.

Axis III Is a *General Medical Condition*, such as diabetes, hypertension, or arthritis, also present?

Axis IV Are *Psychosocial or Environmental Problems*, such as school or housing issues, also present?

Axis V What is the *Global Assessment* of this person's functioning?

Clinicians assign a code from 0 to 100.

91–100	Superior functioning in a wide range of activities; life's problems never seem to get out of hand; is sought out by others because of his or her many positive qualities. No symptoms.
51–60	Moderate symptoms (for example, flat affect or occasional panic attacks) or moderate difficulty in social, occupational, or school functioning (for example, few friends or conflicts with peers or co-workers).
0–10	Persistent danger of severely hurting self or others (for example, recurrent violence), persistent inability to maintain minimal personal hygiene, or serious suicidal act with clear expectation of death.

DSM-IV-TR

The American Psychiatric Association publishes and periodically revises the *Diagnostic and Statistical Manual of Mental Disorders* (now in its fifth edition and with an updated text revision). This volume lists all currently accepted categories of mental disorders and their descriptions. U.S. health care providers require a DSM-5 classification for all treatments they prepay or reimburse.

Look in the first edition, and you won't see anorexia nervosa, although the fourth edition now lists this disorder. The DSM-III dropped homosexuality as a disorder. The terminology also changes occasionally. When I was in college, we used the term *manic-depressive* to describe those who today are diagnosed with *bipolar disorder.* And when Sigmund Freud's influence was greater than it is now, we might have wondered if people were *passive-aggressive* or had a *neurosis.* The authors of the DSM's third and fourth editions dropped both these terms from the list of disorders.

Do the DSM categories work? Are they reliable? That is, could two psychologists independently interview someone and come up with the same diagnosis? Researchers attempting to answer this question had one group of psychologists interview 75 psychiatric patients face to face and assign DSM categories. They videotaped these interviews (but not the final diagnoses) and then asked a second group of psychologists to diagnose the patients, again using DSM categories and guidelines. Both groups assigned the identical diagnosis 83 percent of the time (Riskind et al., 1987). Research of this sort indicates that the DSM categories and guidelines work, but not all the time.

The DSM approach has its critics. Some point out that this classification system is biased in favor of the medical model of psychological disorders. Because it classifies disorders by their "symptoms," the diagnosis of an "illness" is predetermined. The positive psychology movement fostered the development of a diagnostic manual of human strengths, which is kind of the opposite of the DSM (Peterson & Seligman, 2004). (For a closer look at these strengths, see Thinking About Positive Psychology: The Un-DSM.) Other critics note that the number of disorder categories has ballooned. In the 1950s, the first edition of the DSM listed 60 categories. In the 1990s, the DSM-IV listed more than 400. One survey, conducted the year the DSM-IV came out, found that 48 percent of the people living in the United States would qualify for a DSM diagnosis at some point during their lives (Kessler & Zhao, 1999). Finally, critics add that the DSM approach has an additional problem: Diagnoses can create labels, which are often hard to shake.

PAUSE NOW OR MOVE ON

Turn to page 547 to review and apply what you've learned.

Thinking About POSITIVE PSYCHOLOGY

The Un-DSM

Researchers engaged in the positive psychology movement have examined the conditions that allow communities and individuals to flourish. One positive psychologist, Chris Peterson, decided to employ the same process used to develop the DSM to come up with *Character Strengths and Virtues: A Handbook and Classification* (Peterson & Seligman, 2004). Peterson coined this publication the "un-DSM" (Peterson, 2005).

Published 52 years after the first edition of the DSM, the un-DSM organizes 24 strengths into six areas. The manual also contains questionnaires that help researchers assess the strengths. Questionnaires for the 24 strengths abound on the web, but a good place to start is the Brief Strengths Test at www.authentichappiness.org. Completing and getting feedback from this survey provides a glimpse at what may be your areas of personal strength. Researchers like Peterson believe these strengths could be the feeling, thinking, or action tendencies that contribute toward leading a good and meaningful life.

Wisdom and Knowledge

- Curiosity
- Love of learning
- Judgment and open-mindedness (critical thinking)
- Creativity
- Perspective (wisdom)

Courage (Overcoming Opposition)

- Bravery (valor)
- Industry and perseverance
- Integrity and honesty
- Zest (vitality and enthusiasm)

Humanity

- Love
- Kindness
- Social intelligence

Justice

- Citizenship and teamwork
- Fairness and equity
- Leadership

Temperance

- Modesty and humility
- Self-control
- Prudence and caution
- Forgiveness and mercy

Transcendence

- Appreciation of beauty and excellence
- Gratitude
- Hope (optimism)
- Playfulness and humor
- Spirituality and purpose

Modeling Strengths

The people in these photos are exhibiting the signature strengths of playfulness, spirituality, and appreciation of beauty.

VICKI REID/ISTOCKPHOTO

GERRI HERNÁNDEZ/ISTOCKPHOTO

CHRISTOPHE TESTI/DREAMSTIME.COM

Labeling Disorders

WHAT'S THE POINT?

30-4 What are the potential dangers of diagnostic labels, and what are the benefits?

In the presidential election of 1972, Republican president Richard Nixon was running for reelection. Senator George McGovern of South Dakota won the top spot on the opposing Democratic Party's ticket, and he chose Thomas Eagleton as his running mate. The McGovern-Eagleton ticket was doing relatively well in national polls until rumors surfaced about Eagleton's mental health.

In a flurry of activity, the media reported that Eagleton had suffered "nervous exhaustion" in the previous decade and had twice received *electroconvulsive shock therapy (ECT)*. The stigma attached to the disorder and to ECT was so grave that McGovern asked Eagleton to drop out of the race. McGovern's candidacy never rallied, and he lost every state except Massachusetts in that election.

Research suggests we view people differently after they have been labeled (Farina & Fisher, 1982). Studies have shown a clear bias against those labeled with a psychological disorder. Think about this: If you owned an apartment complex, would you rent a room to someone who had been in a mental institution? One study (Page, 1977) put this very question to 180 people in Toronto, Ontario, using phone numbers from ads listing furnished rooms for rent. Check out these results:

- If the caller merely asked if the room was available, the answer was usually *Yes*.
- If the caller said she was about to be released from a mental hospital, three out of four people told her the room was not available.
- If the caller had someone else call back after she had been turned down, asking if the room was available, the answer was usually *Yes*.
- If the caller said she was calling to rent the room for her brother, who was about to get out of jail, three out of four people told her the room was not available.

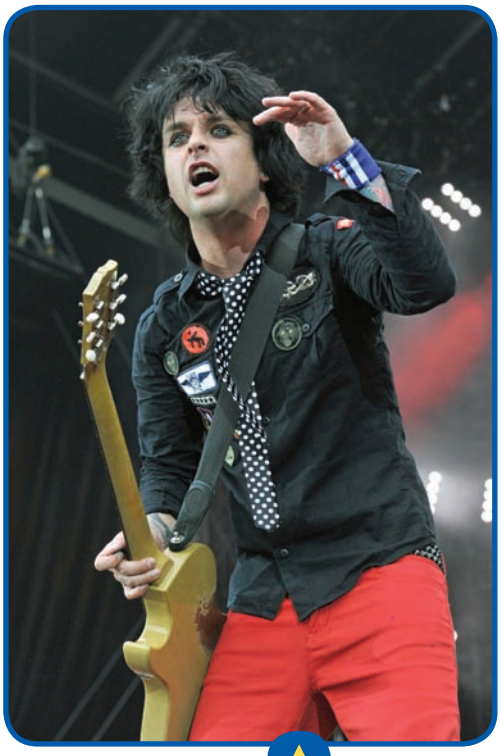
The stigma against released prisoners and mental health patients appears to produce the same results.

The power of labeling is clear in other research as well. In one controversial study (Rosenhan, 1973), eight *healthy* people from Stanford University went to a local mental hospital to check themselves in. All eight gave false names and occupations, and they acted as they normally would—with one exception: Each complained to the interviewer of

Labeling Disorders

Nominated by the Democratic Party to run for U.S. president in 1972, George McGovern chose Thomas Eagleton (left) as his vice-presidential nominee. Eagleton left the ticket amid rumors about his mental health.

AP IMAGES



VILLARD/SIPA (SIPA VIA AP IMAGES)

"Basket Case"

This is the name of a Green Day song, written by front man Billie Joe Armstrong as an expression of his coping with anxiety and panic disorders.

hearing voices that said *thud, hollow,* or *empty.* Hospital personnel diagnosed all eight as mentally ill and admitted them to the hospital. Once admitted to the hospital, the eight people exhibited no further symptoms.

We should not be surprised that these eight were admitted. After all, if you complained of a headache and sore throat, you'd probably be allowed to stay home from school, even if you really felt fine. What is surprising is that *after* these eight were admitted, clinicians "discovered" the causes of the psychological disorders after analyzing their quite normal life histories. For example, one of the eight was said to be reacting with mixed emotions about his parents. And the clinicians perceived abnormal behavior in ordinary acts, such as taking notes, which were often mistakenly labeled as symptoms. Although the eight patients did not report hearing voices again or having similar symptoms, they had average stays of 19 days.

So, how much do labels influence our perceptions? Apparently quite a bit. In another study (Langer & Abelson, 1974; Langer & Imber, 1980), researchers asked participants to judge a videotaped interview and rate the person in the video. All participants saw the same video, but they did not receive the same information *before* viewing and rating the person. Some participants were therapists who believed they were viewing patients. Others were observers who thought they were seeing job applicants. Those who thought they were evaluating a psychiatric patient saw the interviewee as a "passive-dependent type," "frightened of his own impulses," or something similar. Those who thought the person was interviewing for a job saw none of these qualities. Yes, labels can be helpful, but they also hold the potential to shape our thoughts and lead us astray.

Perhaps the media should shoulder some blame for the way we view those with psychological disorders. One 1980s report found that TV programs portrayed 70 percent of the people with psychological disorders as criminals or violent (Gerbner, 1985). This percentage is way out of line with real life, in which 90 percent of the people with psychological disorders are *not* dangerous. Anxious, withdrawn, or depressed? *Yes,* that's common. Dangerous? Unlikely. If those released from mental hospitals stay away from alcohol and other drugs, they are no more likely to become violent than the people they live around (Steadman et al., 1998). Former U.S. surgeon general David Satcher reinforced this point clearly when he wrote that "there is very little risk of violence or harm to a stranger from casual contact with an individual who has a mental disorder" (1999, p. 7). (See Psychology in the Real World: Psychological Disorder Rates for information on the frequency of various disorders.)

So, are labels good or bad? Helpful or harmful? It depends. Labels describe abnormal behavior; they don't explain it. If I tell you my friend has bipolar disorder, you can read the list of symptoms in the DSM-IV-TR and know how he behaves. But you won't have a clue about how or why he developed this disorder. And as we've seen, those who diagnose psychological disorders must be aware of the dangers and drawbacks of labeling, including their effect on

Psychology in THE REAL WORLD

Psychological Disorder Rates

No known culture is free of depression or schizophrenia (Baumeister & Härter, 2007; Draguns, 1990a, 1990b, 1997). In 2008, 13.4 percent of Americans received mental health care (Substance Abuse and Mental Health Services Administration, 2008). This includes people who were admitted to mental hospitals and those who were troubled (but not disabled) who received outpatient care from clinics and other mental health organizations. Most of us will eventually have some experience with the mental health care system, either personally or indirectly by way of close friends or relatives.

Poverty seems to be connected with disorder rates. People below the poverty line are twice as likely as their wealthier counterparts to have a serious psychological disorder (Centers for Disease Control and Prevention, 1992). But this is a correlation, so we cannot assume anything about cause and effect. Does poverty cause the disorder? Does the disorder cause poverty? Or are both caused by something else? The answer varies from disorder to disorder. Schizophrenia, a series of disorders in which a person loses touch with reality, is likely to lead to job loss and poverty. But the stressful and demoralizing conditions of poverty may also contribute to disorders such as substance abuse in men and depression in women (see **Table 30.2**), which are common among Americans today (Dohrenwend et al., 1992).

Table 30.2

Percentage of Americans Who Have Experienced Psychological Disorders in the Past Year

	Percentage
Any mental disorder	26.2
Mood disorders (like depression)	9.5
Generalized anxiety	3.1
Schizophrenia	1.1

Source: National Institute of Mental Health (2008).

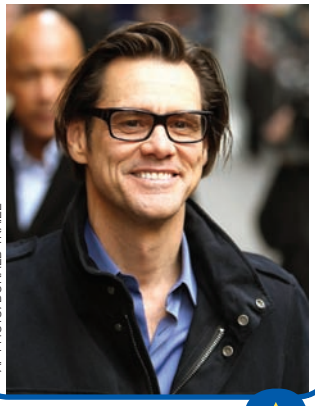
our perceptions. The misdiagnosis of eight healthy people (Rosenhan, 1973) shows us just how easily misdiagnosis can occur.

But we must also remember the benefits of labeling. As we noted earlier in this module, classifications are helpful in giving us thumbnail sketches that let us understand and communicate quickly. A lead author of the current classification system (Spitzer et al., 1989) points out that psychiatric diagnosis helps mental health professionals communicate with one another about psychological disorders, understand some of the processes at work, and guide people toward better outcomes in their treatment.

Have we made any progress since 1972, when the stigma of receiving treatment for a psychological disorder drove Thomas Eagleton out of a presidential campaign? The answer, it is to be hoped, is *Yes*. Seeking treatment for psychological disorders such as depression is now more likely to be seen as a strength than a weakness. Many celebrities, including Drew Barrymore and Jim Carrey, have acknowledged the benefit of seeking and receiving treatment for depression.

Certainly, there are factors that increase the likelihood of mental illness, and the World Health Organization (2004a, 2004b) has identified many of these. But just as there are circumstances that increase the chances of a

AP PHOTO/MATT SAYLES



AP PHOTO/DONALD TRAILL

Getting Help

Many celebrities have sought treatment to overcome depression, often described as the "common cold" of mental illness.

Table 30.3

Risk and Protective Factors for Mental Disorders

Risk Factors	Protective Factors
Academic failure	Aerobic exercise
Birth complications	Community offering empowerment, opportunity, and security
Caring for chronically ill patients or patients with dementia	Economic independence
Child abuse and neglect	Feelings of security
Chronic insomnia	Feelings of mastery and control
Chronic pain	Effective parenting
Family disorganization or conflict	Literacy
Low birth weight	Positive attachment and early bonding
Low socioeconomic status	Positive parent-child relationships
Medical illness	Problem-solving skills
Neurochemical imbalance	Resilient coping with stress and adversity
Parental mental illness	Self-esteem
Parental substance abuse	Social and work skills
Personal loss and bereavement	Social support from family and friends
Poor work skills and habits	
Reading disabilities	
Sensory disabilities	
Social incompetence	
Stressful life events	
Substance abuse	
Trauma experiences	

Source: World Health Organization (2004a, 2004b).

mental disorder developing, so, too, are there protective factors that serve to buffer us against such illness (see **Table 30.3**). Exercise, resilience in coping with adversity, and social support from family and friends are just a few of these. And the good news is that many of these protective factors are within our control to increase or improve.

Many have endured the bewilderment of psychological disorder and also flourished in some ways, including Leonardo da Vinci, Isaac Newton, and the Nobel Prize–winning economist John Nash (the subject of the Oscar-winning movie *A Beautiful Mind*). Nash was fortunate in that he was able to overcome his symptoms, even though they didn't go away entirely, and behave in ways that were not maladaptive, unjustifiable, disturbing, and atypical. For others, hope rests with increased understanding of disorders and improved psychological treatments.

PAUSE NOW OR MOVE ON

Turn to page 548 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 30

Thinking About Introduction to Psychological Disorders

Defining Disorder

WHAT'S THE POINT?

30-1 How do psychologists define what kind of behavior is diagnosed as a psychological disorder?

- A psychological disorder is a harmful dysfunction in which thoughts, feelings, or behaviors are maladaptive, unjustifiable, disturbing, and atypical.
- Maladaptive behaviors are destructive to oneself or others. Unjustifiable behaviors are actions without rational basis. Disturbing behaviors are troublesome to other people. And atypical behaviors are so different that they violate social norms.

Apply What You Know

1. Feeling compelled to cut oneself when stressed would be likely categorized as _____ by a psychologist.
2. Which of the following would be most likely categorized as disturbing by a psychologist?
   a. speaking in nonsense words in public in a loud voice
   b. feeling compelled to hurt another when tired
   c. refusing to read newspapers or watch the news on television
   d. believing that aliens are responsible for starting life on Earth

Understanding Disorders

WHAT'S THE POINT?

30-2 Historically, what were considered the causes of psychological disorders, and what are the current perspectives?

- Perspectives on psychological disorders have changed through the centuries. In the past, many "treatments" for psychological disorders were inhumane.
- French physician Philippe Pinel and other reformers worked to improve the treatment of people with psychological disorders. Pinel's work led to the medical model of mental illness. Use of the medical model has led to successful treatments for many psychological disorders, often involving drug therapy. However, the medical model does not emphasize environmental explanations, overlooking the influence of such factors as stress, upbringing, and personal history.
- The bio-psycho-social approach to psychological disorders studies both nature and nurture and focuses on their interaction. The biological component of the model includes genetic predisposition, or hereditary susceptibility to a disorder. The psychological component of the model includes thoughts or thinking patterns. The social component acknowledges that social and cultural beliefs can affect even the behaviors and beliefs characterizing psychological disorders.

Apply What You Know

3. True or False: Philippe Pinel worked to establish the bio-psycho-social model as the proper way to view mental illness, replacing theories about demonic possession and punishment for sin.
4. The psychological component of the _____ model of psychological disorders emphasizes the effect of how people think and interpret events on psychological disorders.

Classifying Disorders

WHAT'S THE POINT?

30-3 How do psychologists categorize the different psychological disorders?

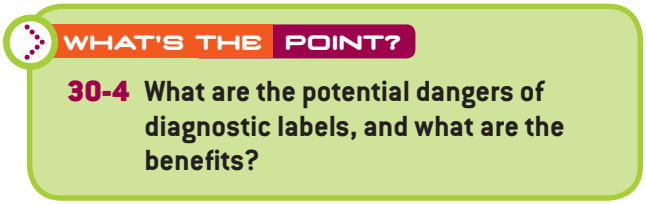
- Clinical psychologists and psychiatrists classify psychological disorders according to their symptoms. This allows them to describe the disorder, predict its future course, treat the disorder appropriately, and provide a springboard for research.
- The American Psychiatric Association developed the *Diagnostic and Statistical Manual of Mental*

Disorders (DSM), a classification system for psychological disorders.

Apply What You Know

5. Which of the following is most likely a goal of the DSM's authors?
   a. identify labels for psychological disorders in various cultures at various historical periods
   b. list human strengths and weaknesses to guide therapists' advice for patients trying to improve their lives
   c. gather all statistics involving psychological disorders to advise government health agencies on policy matters
   d. categorize psychological disorders and describe them specifically enough to guide future research
6. True or False: A criticism of the DSM is that it is biased in favor of the medical model of psychological disorders.

Labeling Disorders



- Research indicates that people who suffer from mental disorders are stigmatized and discriminated against. Studies show that labels tend to alter how we perceive others and labels tend to stick with people even when behaviors are no longer disordered.
- Diagnostic labels from the DSM have disadvantages, but they also help psychologists communicate about psychological disorders, help psychologists understand some processes at work, and can enable better treatment outcomes.

Apply What You Know

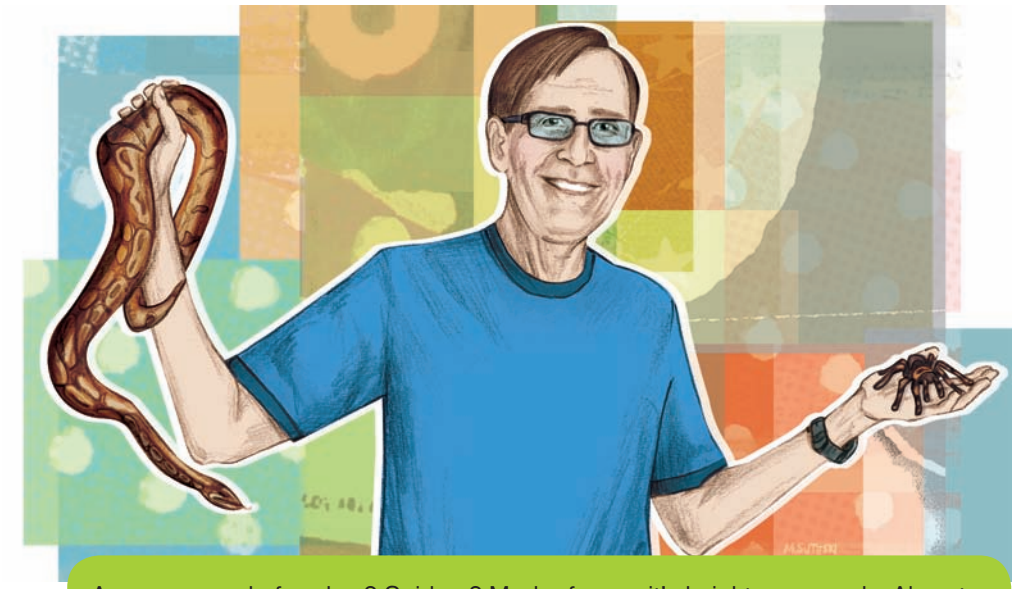
7. True or False: Diagnostic labels tell us how an individual developed a psychological disorder.
8. Rosenhan's 1973 study of healthy individuals from Stanford University who admitted themselves to a mental hospital showed that psychological labels
   a. do not help increase the reliability of diagnoses.
   b. cause excessive stress, which can lead to heart disease.
   c. influence how psychologists interpret normal behaviors of patients.
   d. benefit patients because they enable them to be admitted to effective treatment programs.

KEY TERMS AND KEY PEOPLE

psychological disorder, p. 534
medical model, p. 537
bio-psycho-social model, p. 538
DSM-IV-TR, p. 539
Philippe Pinel (1745–1826), p. 537

MODULE 31

Anxiety and Mood Disorders



Are you scared of snakes? Spiders? Maybe for you it's heights or crowds. Almost all of us feel anxious under some circumstances, and we also experience a variety of moods in our daily lives. When these normal reactions make it difficult to function, we have anxiety or mood disorders. They are among the most common psychological disorders of all.

Anxiety Disorders

- Generalized Anxiety Disorder and Panic Disorder
- Phobia
- Obsessive-Compulsive Disorder
- Post-Traumatic Stress Disorder
- Causes of Anxiety Disorders

Mood Disorders

- Major Depressive Disorder
- Bipolar Disorder
- Causes of Mood Disorders

This module covers two of the most common categories of psychological disorders—anxiety disorders and mood disorders. There is little doubt that you know individuals who struggle mightily with problems related to anxiety and mood. If you are "normal," you have probably struggled occasionally with such problems yourself.

An odd and sometimes troubling aspect of psychological disorders is that it's easy to see the symptoms—almost all the symptoms—in yourself. The symptoms of psychological disorders usually fall along a continuum. They can be mild, serious, or anything between. Typically, there is a "gray area" where it's difficult to decide whether there is a significant problem. This is different from many medical conditions that are more likely to be either present or absent, with nothing between. It doesn't make sense to talk about a woman being kind of pregnant, but it is surely possible to be sort of anxious.

So, I'm going to give you the warning I was given years ago: Don't overreact if you begin to discover in yourself the symptoms we discuss in this module. That's typical, and there's even a name for it—"psychology student's disease." The point

anxiety A vague feeling of apprehension or nervousness.

generalized anxiety disorder An anxiety disorder characterized by disruptive levels of persistent, unexplained feelings of apprehension and tenseness.

to remember is that we all have some of these symptoms some of the time. But they don't suggest a psychological disorder unless they meet four important criteria: symptoms must be *maladaptive* (disrupting normal functioning), *unjustifiable, disturbing,* and *atypical.* For most people most of the time, these symptoms do not meet these criteria. However, if you become concerned that you might be one of the many people affected by the psychological disorders we discuss in this module, you owe it to yourself to have it checked out. Talk to your parents or your guidance counselor for a referral to a mental health professional who can either lay your concerns to rest or help you resolve a problem if it does exist.

Now let's take a look at the anxiety disorders and the mood disorders. These psychological disorders, like all others, are diagnosed according to the criteria established in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision (DSM-IV-TR) (2000). This guide identifies the symptoms that must be present for a diagnosis to be made.

Anxiety Disorders

WHAT'S THE POINT?

31-1 What are the anxiety disorders, and what causes them?

When psychologists speak of **anxiety,** they are referring to a vague feeling of apprehension and nervousness. You've probably experienced anxiety in relation to specific events—big tests, school projects, or important medical tests, for example. You may also have experienced a more general anxiety, such as feeling ill at ease about the changes that college or a new job might bring or concern about how troubling world events will play out. These are both normal types of feelings. Anxiety disorders differ from these feelings in that anxiety—or effort to control it—begins to take control and dominate life.

Anxiety

We all experience anxiety in our lives, often as a response to stressful events. Anxiety is not a disorder unless it begins to create significant difficulties in a person's life.

WILLIE B. THOMAS/ISTOCKPHOTO

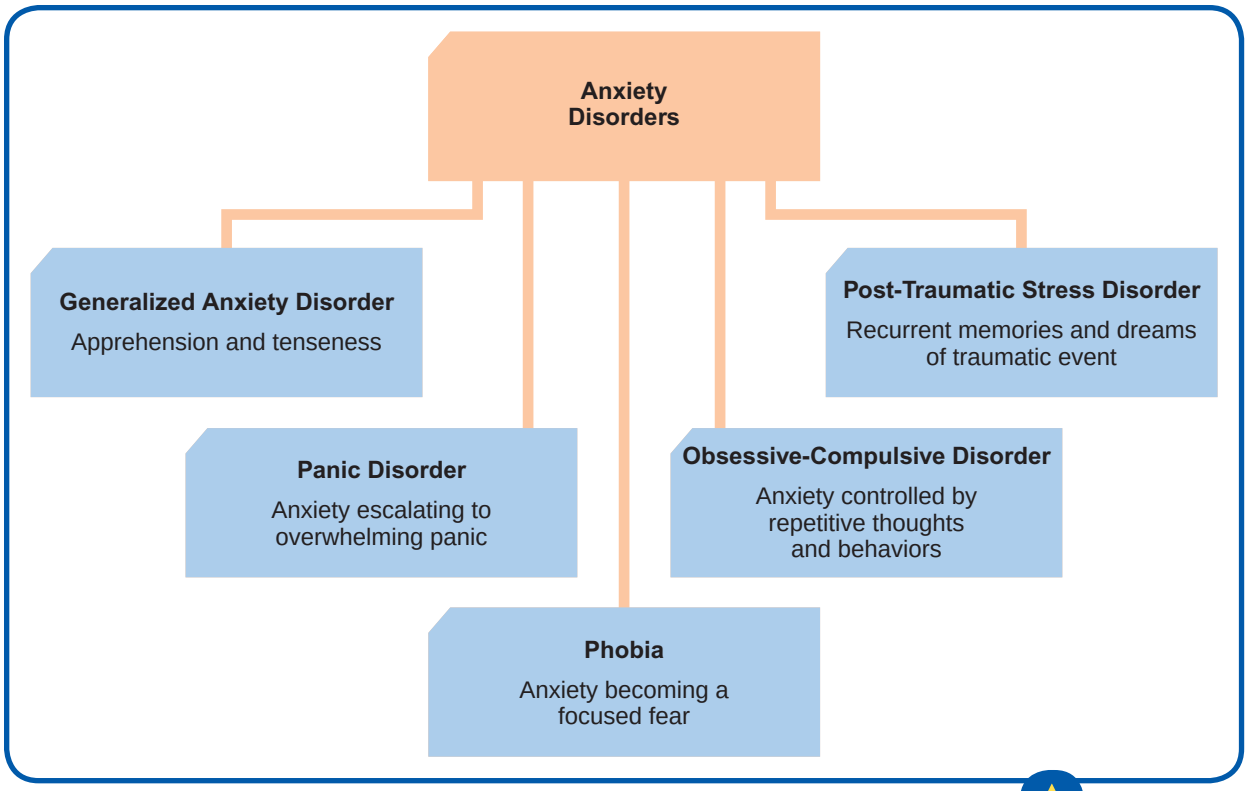


Figure 31.1
Anxiety Disorders

Anxiety is a major component in all anxiety disorders, although it is expressed differently in each disorder.

When this happens, quality of life suffers (Olatunji et al., 2007), and unhappiness increases (Kashdan & Steger, 2006). We discuss five kinds of anxiety disorders (see **Figure 31.1**):

- **Generalized anxiety disorder,** marked by disruptive levels of persistent, unexplained feelings of apprehension and tenseness
- **Panic disorder,** marked by sudden bouts of intense, unexplained panic
- **Phobia,** marked by disruptive, irrational fears of objects, activities, or situations
- **Obsessive-compulsive disorder (OCD),** marked by unwanted, repetitive thoughts and actions
- **Post-traumatic stress disorder (PTSD),** characterized by reliving a severely upsetting event in unwanted, recurring memories and dreams

Generalized Anxiety Disorder and Panic Disorder

Until pharmaceutical companies began advertising drugs to combat *generalized anxiety disorder,* many people had never heard of this condition. It doesn't have the dramatic symptoms of many other psychological disorders and until recently had escaped public attention. The drug company advertisements probably leave many people uneasy because most of us have physical and psychological symptoms on occasion that characterize this disorder. However, the symptoms are more lasting for those who suffer generalized anxiety

panic disorder An anxiety disorder characterized by sudden bouts of intense, unexplained anxiety, often associated with physical symptoms like choking sensations or shortness of breath.

phobia An anxiety disorder characterized by disruptive, irrational fears of objects, activities, or situations.

obsessive-compulsive disorder (OCD) An anxiety disorder characterized by unwanted, repetitive thoughts and actions.

post-traumatic stress disorder (PTSD) An anxiety disorder characterized by reliving a severely upsetting event in unwanted, recurring memories and dreams.

Table 31.1

Symptoms of Generalized Anxiety Disorder

Restlessness
Feeling on edge
Difficulty concentrating or mind going blank
Irritability
Muscle tension
Sleep disturbance

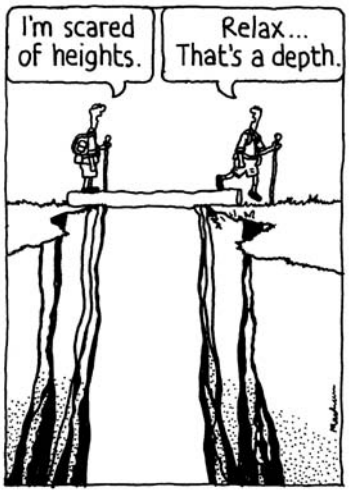
Source: Adapted from American Psychiatric Association (2000).

disorder and are often not attached to any specific event. **Table 31.1** lists these symptoms. Individuals with generalized anxiety disorder must experience at least three of them.

Sometimes the anxiety is accompanied by *panic attacks*—episodes of unexplained terror and fear that something bad is going to happen. The panic attacks, which may last several minutes, usually involve such physical symptoms as choking sensations or shortness of breath. Have you ever experienced panic? I can recall an episode when I was about 12 years old. My parents were out and I had watched a frightening show on television. Although I had no reason to do so, I became temporarily convinced that something horrible had happened to my parents. They were fine, of course, but the panic I experienced was so intense that I still remember it clearly almost 50 years later.

We may all feel panic at some point in our lives, but imagine having these attacks several times each day. You're sitting in class, trying to take notes, and the waves of fear start to wash over you for no apparent reason. Your ability to concentrate is destroyed; all your energy is directed toward trying to regain control. Such is the life of a person with *panic disorder*.

Phobia



WWW.CARTOONSTOCK.COM

Almost everyone has heard the word *phobia,* which many people use to mean fear. ("I have a phobia about taking tests.") To psychologists, however, a phobia is more than just a fear—it is a fear that is both irrational and disruptive. If you were being stalked on a dark street late at night, your fear of the stalker would not be irrational. But note that irrational fear alone is not enough to define *phobia*—the fear must also be disruptive. Most of us have irrational, nondisruptive fears—of harmless snakes or closed-in spaces, for example. My own particular irrational fear is the step from a ladder to a roof. Despite knowing that I can make the step safely, I hate it. I hate it to the extent that I have never been on the roof of the house in which I have lived for more than 20 years. If I were a roofer or a fireman, this fear would be disruptive. But I'm a teacher, and I seldom need to climb onto my roof. On those rare occasions when this becomes necessary, I simply have one of my sons do it or call someone else to do the job. My fear is intense and irrational, but it's not disruptive.

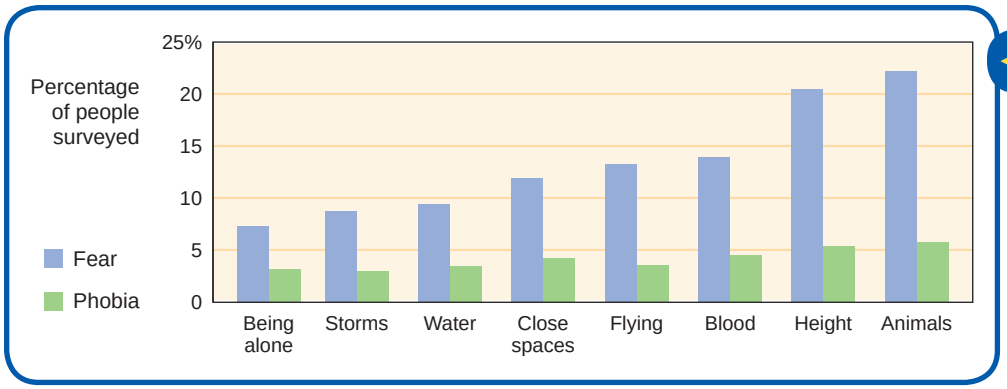


Figure 31.2
Some Common—and Not-So-Common—Fears

A national survey identified the percentage of people indicating various specific fears. (From Curtis et al., 1998.)

Why are phobias considered anxiety disorders? Because they focus general feelings of anxiety onto a feared object, activity, or situation (see **Figure 31.2**). Most phobias involve fear of a particular object, and their names are formed by combining the Greek word for the object with *phobia,* which is the Greek word for "fear." Fear of spiders, for example, is called arachnophobia. Broader phobias also occur.

Social phobias produce fear in social situations. For example, some people have extreme difficulty speaking in public, even to the extent of being unable to respond to questions from a clerk in a store. Others cannot eat in the presence of others or use public restrooms. As you might imagine, social phobias can seriously impair a person's ability to lead a normal life.

Agoraphobia is fear of situations the person views as difficult to escape from if panic begins to build. Many people with this disorder become trapped in their own homes or in similar safe zones. I once had dinner with a woman from my town who was recovering from agoraphobia. She was a middle-aged widow who lived by herself and could not leave her home without experiencing intense fear. She described to me the difficulty of ordinary tasks like grocery shopping, which was to her similar to a military commando raid. Only with intense planning and determination could she leave her car, quickly collect the two or three items she needed most, and make it through checkout before dashing back to her car. Often she began to feel panicky during her

PHOTOS 12/ALAMY

Ophidiophobia

Even a swashbuckler like Indiana Jones is not immune to psychological disorders, in this case a phobia of snakes.

few minutes in the store, and sometimes she had to abandon her grocery shopping only to face another trial the next day. Over the course of the last 15 years, which had included some therapy, she had largely conquered her agoraphobia. She was happy to say she had even been able to take a European vacation a few years ago.

Obsessive-Compulsive Disorder

The two major symptoms of *obsessive-compulsive disorder* are, as you might imagine, obsessions and compulsions. *Obsessions* are repetitive thoughts, and *compulsions* are repetitive actions. Almost everyone experiences both symptoms to some degree on a harmless level. In my classroom, I notice a lot of faraway stares as homecoming and prom weekends approach. I know many of these students can't stop thinking about the upcoming event (at least that was the case for me when I was a student!). Other times we may hear a song and then be unable to get it out of our head.

We all have compulsions, too. One day I watched a student walk down the hall tapping the eraser of his pencil on every locker. Somehow he missed the last locker in the row and managed to make it about 10 yards down the hall before having to return to tap that last locker. You could almost feel his discomfort until the task was complete. You may have done something similar as a child. Remember that old rhyme about "step on a crack and break your mother's back"? Were you able to step on sidewalk cracks easily after learning that rhyme?

Obsessive-compulsive tendencies can be helpful sometimes. Most good athletes are obsessed with winning and compulsive about training. And most good students are a bit obsessed with grades and a bit compulsive about studying. These tendencies help us develop important routines, such as fastening our safety belt when we get in a car or brushing our teeth regularly.

Obsessions and compulsions, however, begin to take control with some people, and this is when helpful tendencies become OCD. One common

Don't Touch Me

The title of Howie Mandel's 2009 memoir clearly illustrates the comedian and TV host's germ phobia.

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Table 31.2

Common Obsessions and Compulsions Among Children and Adolescents With Obsessive-Compulsive Disorder

Thought or Behavior	Percentage Reporting Symptom
• Obsessions (repetitive thoughts)	
Concern with dirt, germs, or toxins	40
Something terrible happening (fire, death, illness)	24
Symmetry, order, or exactness	17
• Compulsions (repetitive behaviors)	
Excessive hand washing, bathing, toothbrushing, or grooming	85
Repeating rituals (in/out of a door, up/down from a chair)	51
Checking doors, locks, appliances, car brakes, homework	46

Source: Adapted from Rapoport (1989).

obsession focuses on germs and develops with a compulsion in the form of repetitive hand washing. Individuals may wash their hands hundreds of times each day. Often, they engage in a hand-washing ritual that may take many minutes to complete, much like a surgeon scrubbing up before an operation. As long as such people have the opportunity to engage in their rituals, their anxiety remains under control. If they are somehow prevented from engaging in their ritual behavior, then anxiety and panic rapidly build.

Other common patterns of OCD involve dressing rituals, where a person may take hours to shower and dress each morning because he has hundreds of required steps that must be followed. Another common pattern is checking and rechecking a lock or an electrical switch. The person might return to the car 10 times in a row to make sure the lights are off and the door is locked. **Table 31.2** lists some common obsessions and compulsions of children and adolescents with this disorder.

Post-Traumatic Stress Disorder

What do military combat veterans, rape victims, abused children, and rescue workers who have to clean up gruesome accident sites have in common? They are all at increased risk for *post-traumatic stress disorder.* Intense stress is the trigger, and symptoms include nightmares, persistent fear, difficulty relating normally to others, and troubling memories of or flashbacks to the traumatic event (American Psychiatric Association, 2000).

The September 11, 2001, attacks on the World Trade Center and the Pentagon were events with the potential to produce many cases of PTSD, with one study showing that 20 percent of the people living near the World Trade Center experienced symptoms like nightmares (Susser et al., 2002). Children may be particularly vulnerable because witnessing or experiencing trauma

may instill a sense of hopelessness about the future and may impair their ability to trust. The negative consequences of bad experiences can produce increased anxiety and other symptoms for many years. PTSD can have a particularly devastating impact on combat veterans. One in four U.S. veterans from the conflicts in Iraq and Afghanistan were diagnosed with a psychological disorder in one study, and the most frequent of these was PTSD (Seal et al., 2007). (For encouraging news on reducing the incidence of PTSD in soldiers and others, see Thinking About Positive Psychology: Comprehensive Soldier Fitness.)

Thinking About POSITIVE PSYCHOLOGY

Comprehensive Soldier Fitness

Stress is a constant in life—everybody experiences difficult events—but the response to stress is not the same for everyone. Why is it that some people struggle in the face of adversity while others seem to survive or even thrive? Far more people experience trauma than develop post-traumatic stress disorder (Ozer & Weiss, 2004). Most combat veterans and even most victims of political torture do not develop PTSD. What determines who does and who doesn't?

Those who make it through the aftermath of trauma largely unscathed possess a quality known as *survivor resiliency* (Bonanno, 2004, 2005). Some go beyond resiliency and experience *post-traumatic growth.* Their suffering has led to inner strength, increased appreciation, and better relationships. A primary goal of positive psychology is to increase the percentage of people who can weather the storms of trauma more effectively. The key seems to be to prepare people in advance with cognitive and behavioral strategies that allow them to cope with stress more effectively.

Is this possible? It is increasingly looking like the answer is *Yes.* Work done by Martin Seligman and his colleagues to develop positive education in school systems has resulted in programs that teach teachers how to develop resiliency skills in students (Seligman et al., 2009). These programs have shown lasting reductions in anxiety and depression among the students who are taught the new skills.

Perhaps the most ambitious initiative of all began in 2009 with the start of the U.S. Army's Comprehensive Soldier Fitness (CSF) program (Casey, 2011). Under this program, Seligman's team at the University of Pennsylvania is preparing thousands of Army master resiliency trainers. These master trainers will teach appropriate resiliency skills to Army leaders in every battalion and brigade. All new recruits will learn resiliency skills as a part of their basic training. The family members of soldiers and civilian workers in the military will be trained as well. All these individuals are, or are close to, people at high risk for PTSD, especially when soldiers are deployed in combat. The goal is to increase resiliency to prevent psychological disorders and help everyone live healthier, happier lives.

Combat and Stress

One goal of positive psychology is to prevent psychological problems related to the stress of combat. Helping soldiers and their families become more resilient may result in fewer problems to treat when the soldiers return from war.

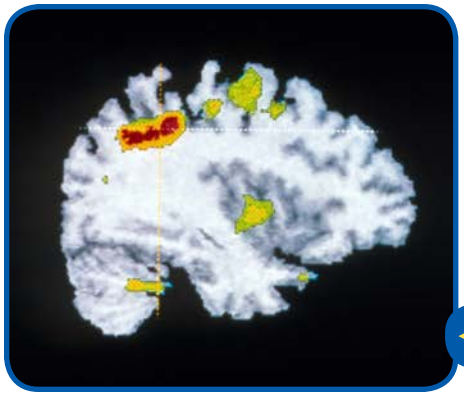
AFP/GETTY IMAGES/NEWSCOM

Causes of Anxiety Disorders

Anxiety disorders could be caused by nature (the effect of our inherited biology) or nurture (the influence of our environment). As is almost always the case, both factors are important.

Biological Factors Anxiety disorders, like so many other areas that psychologists study, illustrate the interaction between our biology and our environment. Some biological factors that contribute to anxiety disorders are these:

- *Heredity*—Some of us inherit a *predisposition,* or likelihood, for developing anxiety disorders. Evidence for this comes from studies of identical twins, who are genetically the same. Even when raised in different families, identical twins sometimes have similar phobias (Carey, 1990; Eckert et al., 1981). The influence of heredity is also apparent in monkey studies demonstrating that fearful parents are likely to have fearful children (Suomi, 1986). The specific fear is not inherited, but the predisposition to be fearful is. The search is on for the genes that lead to this predisposition, and 17 genes with connections to anxiety disorder symptoms have been identified (Hovatta et al., 2005).
- *Brain function*—Brain-scanning techniques show that people with anxiety disorders have brains that literally function differently than those of people who do not have anxiety disorders. As **Figure 31.3** illustrates, brain scans show a higher degree of activity in a part of the frontal lobes of people with OCD (Ursu et al., 2003). Because the frontal lobes are involved with decision making, the bright red and yellow shown in that area of the brain of the person with OCD may indicate a source of the problem. An emotion center, the *amygdala,* also shows differences for people with phobias (Etkin & Wager, 2007; Kolassa & Elbert, 2007; Maren, 2007). It's possible that their intense fear is caused by the activity in the amygdala. Because brain function is involved, anxiety disorders often respond to treatment with medication.
- *Evolution*—We are likely to fear situations that posed danger to the earliest humans. Dangerous animals, heights, and storms were



WDCN/UNIV. COLLEGE LONDON/SCIENCE SOURCE

Figure 31.3
The Brain and Obsessive-Compulsive Disorder

Brain scans have been used to show that people with obsessive-compulsive disorder (OCD) have more activity in decision-making areas at the front of the brain than do people without OCD. The brain scans of those with OCD indicated increased activity in a part of the brain known as the anterior cingulate cortex.

Heredity and Fear

We don't appear to inherit specific fears, but we do inherit a predisposition to develop fears. This is why identical twins are more likely than other siblings to share the same fears, even if they are not raised together.

NORBERT SCHAFER/CORBIS

threats, and people who didn't have a healthy dose of fear were less likely to survive. Those who did survive passed on to us—their descendants—their tendency to fear these dangers. Many of us share these fears to this day, even though our modern world has made these threats less dangerous than they once were. For example, preschool children can find a snake in a scene more quickly than they can find a flower or a frog (LoBue & DeLoache, 2008). Unfortunately, we don't have a similar inherited tendency to fear threats that have developed more recently. Cars, for example, kill far more people in the modern world than snakebites do, yet more people fear snakes than fear cars.

Learning Factors Learning gone awry can also produce anxiety disorders. Sometimes we learn to respond well in stressful situations, but if we learn maladaptive responses they can blossom into anxiety disorders. These factors can contribute:

- *Conditioning*—Ivan Pavlov became famous for his studies in which dogs learned to associate the sound of a tuning fork with the taste of meat, salivating equally to both. Humans can also learn to associate fear with certain places or things. John B. Watson and Rosalie Rayner (1920) demonstrated this in their famous research with "Little Albert," an infant who learned to fear white rats. Watson and Rayner established the fear by pairing the sight of a rat with loud, frightening noises. Few of us would deliberately teach a child fear, but the child might learn to associate fear and dogs if exposed to a menacing growl or bite when young. Unpredictable and uncontrollable bad events can contribute to the conditioning of anxiety (Field, 2006; Mineka & Zinbarg, 2006).
- *Observational learning*—Children can also learn fears at their parents' knees. If a child sees a parent or older sibling responding with fear to thunderstorms, bees, or high places, the child may begin to experience the same fear. Even young monkeys learned to fear snakes when given the opportunity to watch other monkeys avoid situations in which a snake was present (Mineka, 1985).

- *Reinforcement*—We also learn to associate emotions with actions, depending on the results that follow those actions. A person with a fear of heights can reduce the fear by avoiding heights. That release from anxiety makes it more likely that the person will avoid heights in the future. A person with an obsessive-compulsive hand-washing ritual can reduce anxiety by washing and will therefore repeat that action. We tend to repeat responses that have good results and avoid those that have bad results.

No one has an anxiety-free life. But when the anxiety begins to take control (as in the case of a generalized anxiety disorder), refocus as fear (as in the case of a phobia), drive us to rigidly repeated thoughts and behaviors (as in the case of obsessive-compulsive disorder), or make it impossible to escape an earlier horror (as in the case of post-traumatic stress disorder), anxiety has crossed the line and has become a psychological disorder.

PAUSE NOW OR MOVE ON

Turn to page 567 to review and apply what you've learned.

OWEN FRANKEN/CORBIS

Nature or Nurture?

The baby may be biologically predisposed to fear heights, but she may also learn this fear by watching her mother.

Mood Disorders

WHAT'S THE POINT?

31-2 What are the mood disorders, and what causes them?

Mood disorders are disturbances of emotions. Like other psychological disorders you've read about in this module, mood disorders are magnifications of our normal reactions. The magnified states in mood disorders are mania and depression. *Mania* is a period of abnormally high emotion and activity. Has anyone ever said to you, "Don't be so manic"? People often use that statement when they simply mean "Calm down—don't get so excited." Life would be dull if we could never feel elated or excited or wildly enthusiastic. But what if you felt intense mania for days or even weeks and just couldn't calm down? As you'll see later in this section, some people do, and it's not pleasant.

It is a rare individual who never feels depressed. Can any of us say that we never feel down, sad, or drained of energy? Depression is a normal response to the loss of many of the important things in life, including the death of loved ones, the end of important relationships, the loss of a job, or even graduation from the comfortable familiarity of high school (Wakefield et al., 2007). We can even become depressed over distant events, such as famines or outbreaks of violence in far corners of the world. From an evolutionary perspective,

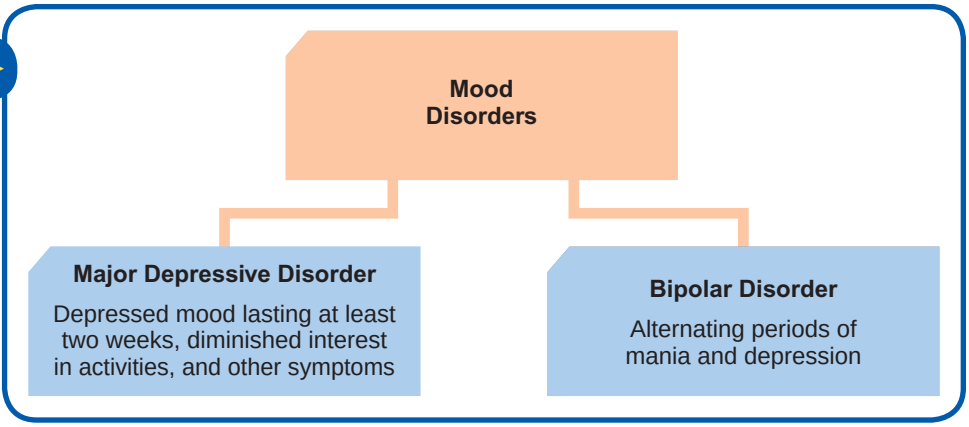
Depression

Anguished depression can be a normal response to tragic events. Specific criteria must be met before a diagnosis of major depressive disorder is made.

MARTIN DIVISEK/ISIFA/GETTY IMAGES

Figure 31.4
Mood Disorders

Such disorders are disturbances of emotion.


Mood Disorders
Major Depressive Disorder
Depressed mood lasting at least two weeks, diminished interest in activities, and other symptoms
Bipolar Disorder
Alternating periods of mania and depression

depression probably exists to give us time to slow down and reflect on why a bad thing has occurred. This allows us to perhaps avoid similar losses in the future (Watkins, 2008). How do we know where to draw the line between normal reaction and mood disorder? Keep this question in mind as we consider the two main mood disorders, major depressive disorder and bipolar disorder (see **Figure 31.4**).

Major Depressive Disorder

Major depressive disorder is the most common disability in the world, affecting almost 6 percent of men and nearly 10 percent of women (World Health Organization, 2002). Among college students, 44 percent in one survey said that they had been depressed enough that it was difficult to function at least once in the past year (American College Health Association, 2006). Therapists say that depression has crossed the line from a normal reaction to major depressive disorder when five of the following nine symptoms have been present for two or more weeks (note that one of the first two symptoms must be included in those five) (American Psychiatric Association, 2000):

- Depressed mood most of the day, nearly every day (in children and adolescents, an irritated mood satisfies this requirement)
- Little interest or pleasure in almost all activities
- Significant changes in weight or appetite
- Sleeping more or less than usual
- Agitated or decreased level of activity
- Fatigue or loss of energy
- Feelings of worthlessness or inappropriate guilt
- Diminished ability to think or concentrate
- Recurrent thoughts of death or suicide

major depressive disorder
A mood disorder in which a person, for no apparent reason, experiences at least two weeks of depressed moods, diminished interest in activities, and other symptoms, such as feelings of worthlessness.

These symptoms must also produce distress or impaired functioning to qualify as indicators of major depressive disorder. One of the main differences between major depressive disorder and normal grief is the apparent

reason for the emotions. Grief over the loss of a loved one is an understandable reaction. In contrast, there may be no apparent trigger for major depressive disorder.

Major depressive disorder feels like an inescapable weight affecting every aspect of life, and it can even lead to suicide (see Psychology in the Real World: Suicide on pages 562–563).

bipolar disorder A mood disorder (formerly called *manic depressive disorder*) in which the person alternates between the hopelessness of depression and the overexcited and unreasonably optimistic state of mania.

Bipolar Disorder

People with **bipolar disorder** (previously known as *manic depressive disorder*) alternate between the hopelessness of depression and the overexcited and unreasonably optimistic state of mania. This disorder is less common than major depressive disorder, but it has a more devastating effect on people's ability to function. Twice as many workdays are lost each year to bipolar disorder than to major depression (Kessler et al., 2006).

It's good to be optimistic, but the manic phases of someone with bipolar disorder are well beyond normal. During mania, the person may go long periods without sleeping and may experience racing thoughts, be easily distracted, and set impossible goals.

These manic phases, like the bouts of depression that occur in major depressive disorder, tend to have hills and valleys. Moods generally follow cyclical patterns—most people find that they swing through some periods when they feel a little down and others where they feel great. Mania is sometimes associated with bursts of creative energy (Jamison, 1993, 1995). Many well-known creative people, from Mark Twain to Vincent van Gogh, are believed to have suffered from bipolar disorder.

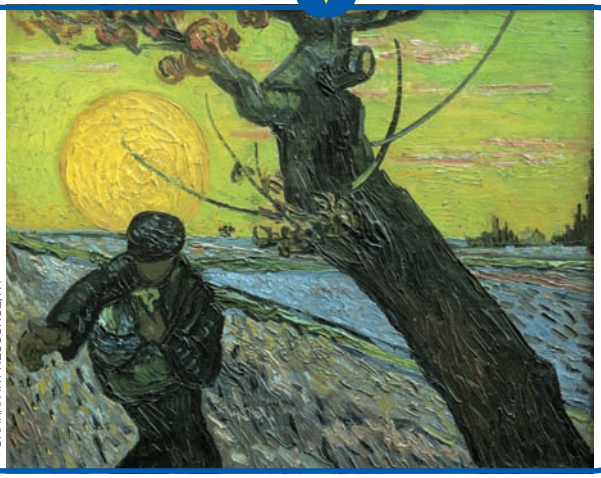
Vincent van Gogh

It is difficult to diagnose mental illness in historical figures, but van Gogh quite possibly suffered from bipolar disorder. His life alternated between periods of blazing creativity—sometimes he finished more than a painting a day—and periods of deep depression. He committed suicide in 1890.

Causes of Mood Disorders

As with anxiety disorders, no single explanation sheds light on all mood disorders. Again, biology and environment interact. Stress also seems to play a role, providing a trigger that sparks mood disorders when other factors are present.

WHEATFIELD WITH REAPER, 1889 (OIL ON CANVAS), GOGH, VINCENT VAN (1853–90)/VAN GOGH MUSEUM, AMSTERDAM, THE NETHERLANDS/THE BRIDGEMAN ART LIBRARY INTERNATIONAL



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Psychology in THE REAL WORLD

Suicide

When I was a junior in high school, back in the late 1960s, a fellow student didn't appear for class one day shortly after breaking up with a longtime girlfriend. As the day wore on, rumors that he had committed suicide began to travel through the student body. The rumors proved to be true, but nobody ever dealt with the issue openly. Teachers, counselors, administrators, and parents seemed united in their desire not to talk about something they found disturbing and unexplainable. Students were left to sort out their questions and feelings on their own, and the school never even issued an official acknowledgment of what had happened.

There have also been student suicides, and suicide attempts, in the school where I now teach. Seeing this important issue brought into the open has been gratifying. In recent years, the administration put into place a crisis response plan to help both students and faculty members cope with the emotional effect of the loss or injury of a student. Instead of pretending that nothing has happened, the school issues announcements, runs articles in the school newspaper, and ensures that counselors are available to help friends and classmates with their grief and questions. Bringing the topic of suicide into the light of day may prevent others from making this tragic choice.

One interesting fact about suicide is that people who are deeply depressed rarely kill themselves until after the depression starts to lift. This is confusing to friends, because the suicide occurs just as the person seems to be getting better. Ironically, this lifting of depression gives the person the energy to execute a plan developed when depression was so overwhelming that it effectively stopped action.

IAN SHAW/ALAMY IMAGES

Symptoms of Depression

One symptom of depression is the diminished ability to think or concentrate. This student has difficulty concentrating on her schoolwork.

For adolescents, to have occasional, passing thoughts of suicide is neither unusual nor a cause for concern. But becoming obsessed with thoughts of suicide, or starting to develop plans for committing suicide, is. It's quite likely that a suicide or suicide attempt of someone you know will touch your life, if it has not already done so. If you have a friend who appears deeply depressed, is preoccupied with death, begins to give away prized possessions, or talks openly about suicide, take the signs seriously. Encourage the

Biological Factors Our physical and psychological future is not written in our genes, but genetics does set limits on some of our choices. For mood disorders, both heredity and brain function appear to be important biological factors.

- *Heredity*—Many disorders run in families, and mood disorders are no exception. We can see the influence of heredity in twin studies. Genetically, fraternal twins (who develop from two fertilized egg cells) differ from each other as much as any other two siblings. If one fraternal twin has major depressive disorder, the other twin has a 20 percent

person to seek help immediately (one option is to call the National Suicide Prevention Hotline, available toll-free 24 hours a day at 1-800-273-TALK) and consult with a parent, teacher, counselor, physician, or religious leader to make sure you have done all that you can. If you begin to feel suicidal, seek help. The dark mood will lift, and better days do lie ahead.

Nearly a million people worldwide commit suicide each year (World Health Organization, 2008d). Consider these differences in suicide rates for different groups:

- In general, Western countries have a higher rate of suicide than non-Western countries, but there is great variation even among Western countries. The rate in England is about half the U.S. rate, and the rate in Finland is about double (World Health Organization, 2008d).
- In most parts of the world, men are more likely than women to commit suicide. Women, however, are at least twice as likely to *attempt* suicide. Men succeed more often because their method of choice is firearms, which are more lethal than the drug overdoses preferred by women (World Health Organization, 2008d).
- White Americans have a higher suicide rate than other racial groups (National Institute of Mental Health, 2002).
- Suicide rates increase with age. The highest rate of suicide is among older men (see **Figure 31.5**).
- Suicide rates have been increasing over time. For 15- to 25-year-olds, the suicide rate doubled between 1960 and 1990 (Eckersley & Dear, 2002).
- There is a strong link between drug and alcohol use and suicide. The risk of suicide is 100 times greater among those dependent upon alcohol (Murphy & Wetzel, 1990).

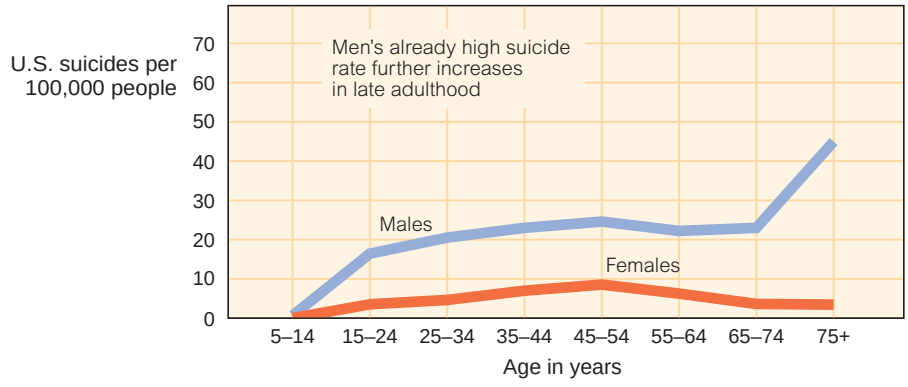


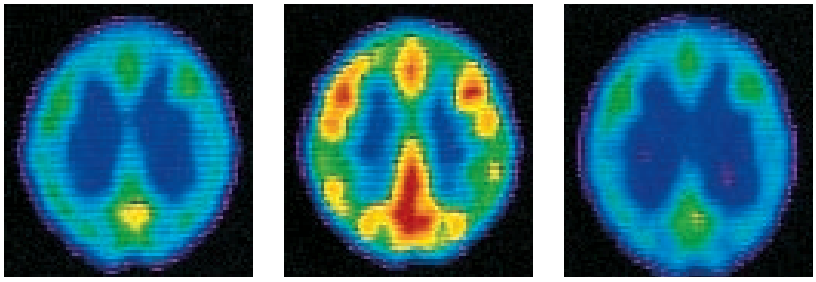
Figure 31.5
Suicide, Gender, and Age

Suicide is more common among men than women at all ages. Elderly males have the highest rate of suicide. (From Statistical Abstracts, 2008.)

chance of developing depression. The odds are significantly higher for identical twins (who have identical genes because they develop from a single fertilized egg cell). If one identical twin has major depressive disorder, the second twin's chances rise to about 50 percent. The trend is even more pronounced for bipolar disorder, with the second identical twin having a 70 percent chance of developing bipolar disorder if the first twin has it (Tsuang & Faraone, 1990). Note, however, that genes do not determine the disorder. For major depressive disorder, 50 percent of identical twins do *not* develop the condition if their twin has the

Figure 31.6
Bipolar Disorder and Brain Scans

These PET scans show that mood and brain activity are correlated. The yellow and red areas of the middle scan indicate that the brain is more active during the manic phase of bipolar disorder.



Depressed state (May 17) | **Manic state** (May 18) | **Depressed state** (May 27)

COURTESY OF LEWIS BAXTER AND MICHAEL E. PHELPS, UCLA SCHOOL OF MEDICINE

disorder. For bipolar disorder, 30 percent do not develop it if the other twin has it.

- *Brain function*—Depressed people have depressed brains (see **Figure 31.6**). Positive emission tomography (PET) scan studies indicate that the brain is less active during major depression, especially in frontal lobe regions that are normally active during positive emotions (Davidson et al., 2002). It is also true that certain neurotransmitters—the chemical messengers that allow individual neurons in the brain to communicate with one another—appear to be out of balance in the case of mood disorders. The two neurotransmitters that are most important for depression are serotonin and norepinephrine, which are lacking during times of depression. The levels of these neurotransmitters may ultimately be controlled by genes. People who experience major stress are much more likely to develop depression if there is a problem with a gene that controls serotonin levels (Moffitt et al., 2006). Prozac and other antidepressant medications help restore the proper levels of these neurotransmitters.

Social-Cognitive Factors Psychologists operating from the biological and cognitive perspectives have made tremendous progress in explaining behavior and mental processes in recent years. In addition to the biological influences described in the previous paragraphs, researchers have identified a number of important social and cognitive influences. Psychologists look closely at the interplay among the way we think, the situations we find ourselves in, and the way we feel. These social and cognitive factors actually affect brain chemistry and are affected by it. Complicated? *Yes,* but mood disorders are complex, and we would be unrealistic to expect simple explanations for these conditions. Consider a few social-cognitive influences:

- *Learned helplessness*—People develop a sense of helplessness when subjected to unpleasant events over which they have little or no control. As they acquire this feeling of helplessness, they give up and no longer try to improve their situation because they learned in the past that efforts to improve the situation will not work. This alone can produce depression. Learned helplessness may be one reason women suffer higher rates of depression than men do. Compared with men, women

JAIME PUEBLA/AP/WIDE WORLD PHOTOS

Learned Helplessness

When people find themselves in unpleasant situations over which they have little control (like this woman doing tedious, poorly paid factory work), learned helplessness can set in. This, in turn, is associated with depression.

are more likely to be abused, stressed, and overwhelmed (Hankin & Abramson, 2001; Mazure et al., 2002).

- *Attributions*—When things go wrong, we try to explain them. Your *explanatory style* is determined by the nature of the explanations, or attributions, that you make. These attributions can vary from person to person. It turns out that depressed people are likely to make attributions with the following characteristics (see **Figure 31.7**):
  - *Stable*—The bad situation will last a long time.
  - *Internal*—This happened because of my actions, not because of the actions of someone else and not because of the circumstances.
  - *Global*—My explanation applies to many areas of my life.

If I fail a history test and explain this by saying, "I'm stupid," I've met all these conditions. This attribution is stable (stupidity doesn't come and go; it stays with me), internal (stupidity is a personal characteristic), and global (being stupid affects most of the things I do). One theory (Abramson et al., 1989; Panzarella et al., 2006) says that these attributions lead to a sense of hopelessness that produces depression.

Notice that this sense of hopelessness is less likely if attributions change. If I say I failed a history test because I was sick that day, even though being sick is internal and global, my explanation is not stable (I haven't said I'll

Figure 31.7
Attributions and Depression

How we explain events—such as losing a job—is associated with depression. People with depression are likely to explain events with stable, internal, and global statements.

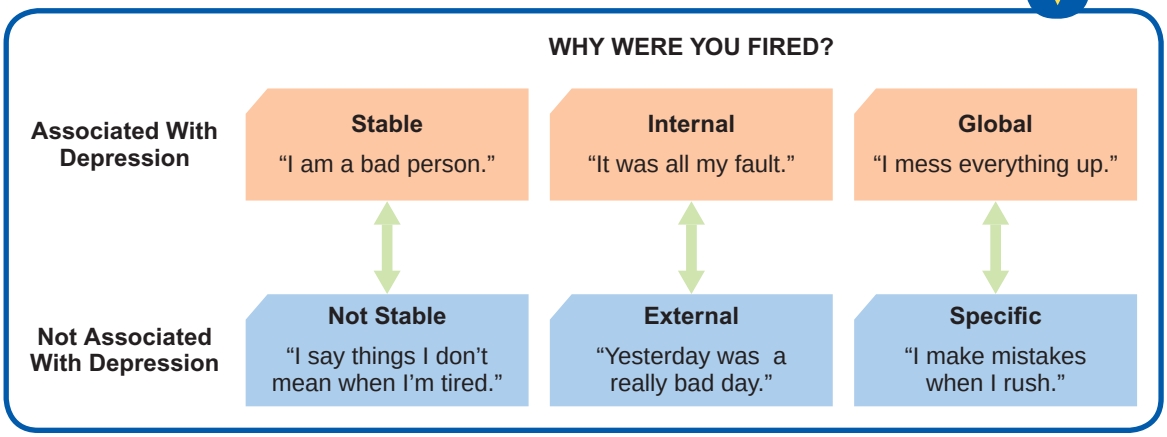
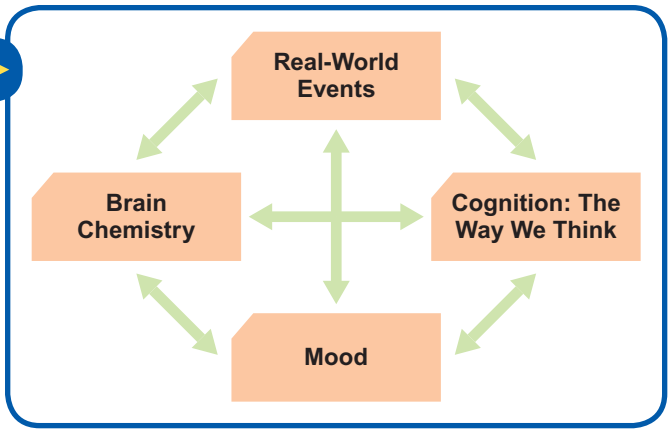


Figure 31.8
What Determines Mood?

Mood flows from a complex interaction of biological and social-cognitive factors. These factors influence one another and are influenced by external events and internal moods. Attempts to improve mood can focus on controlling the environment, prescribing medications to change brain chemistry, or changing the way the person thinks.



always be sick). Thus, I'm less likely to feel hopeless and depressed. If I say I failed the history test because I have a bad teacher, my attribution is not internal—I haven't taken personal responsibility. Again, I avoid depression. Teaching people to change their attributions can be an effective way of treating depression.

All these factors, biological and social-cognitive, can interact to form a vicious cycle of depression (see **Figure 31.8**). A person's heredity might predispose depression by allowing the balance of neurotransmitters to operate in a range associated with mood disorders or by "programming" the brain to function differently. The environment might be stressful and full of situations over which a person has little control. This might produce learned helplessness and discouragement, which—combined with attributions that are stable, global, and internal—pave the way to mood disorders. It is possible that the mood disorders, environmental conditions, or the way a person thinks can produce further alterations of brain chemistry and function, making negative thinking and emotions even more likely in the future. These factors, working together, become a psychological trap.

PAUSE NOW OR MOVE ON

Turn to page 567 to review and apply what you've learned.

In this module, we examined two of the more common categories of psychological disorders: anxiety disorders and mood disorders. According to some estimates, roughly one-quarter of us will experience a disorder from one of these two broad categories at some point in life (Robins & Regier, 1991). Researchers have begun to unravel the complicated story of what causes anxiety and mood disorders. As they continue to make progress, even more effective treatment options will become available to help those who suffer from these widespread conditions.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 31

Thinking About Anxiety and Mood Disorders

Anxiety Disorders

WHAT'S THE POINT?

31-1 What are the anxiety disorders, and what causes them?

- Generalized anxiety disorder is marked by disruptive levels of persistent, unexplained feelings of apprehension and tenseness.
- Panic disorder is marked by sudden bouts of intense, unexplained panic.
- Phobia is marked by disruptive, irrational fears of objects, activities, or situations.
- Obsessive-compulsive disorder is marked by unwanted, repetitive thoughts and actions. Obsessions are repetitive thoughts. Compulsions are repetitive actions.
- Post-traumatic stress disorder is characterized by reliving a severely upsetting event in unwanted, recurring memories and dreams.
- Several biological factors may contribute to anxiety disorders, including heredity and brain function as well as evolution and natural selection.
- People may learn maladaptive responses that can blossom into anxiety disorders. These include associating fear with certain places or things (conditioning), learning fear or anxiety responses by watching others experience them (observational learning), and learning to associate emotions with actions and the results that follow those actions (reinforcement or punishment).

Apply What You Know

1. All of a sudden, Roberto started sweating, his heart started racing, and he felt like he couldn't breathe. Which of the following fits Roberto's symptoms best?
   a. panic disorder
   b. social phobia
   c. post-traumatic stress disorder
   d. obsessive-compulsive disorder
2. A person with a(n) _____ might wash his or her hands 100 times each day.
3. Baghya fears flying and feels relieved whenever she can avoid traveling by air. This is an example of how phobias can be influenced by
   a. observational learning.
   b. reinforcement.
   c. heredity.
   d. evolution.
4. True or False: Obsessive-compulsive disorder produces increased activity in the rear of the brain.

Mood Disorders

WHAT'S THE POINT?

31-2 What are the mood disorders, and what causes them?

- Major depressive disorder is diagnosed when five of the following nine symptoms (including one of the first two) are present for two or more weeks: depressed mood most of the day, little interest in activities, changes in appetite, changes in sleep, changes in activity level, fatigue, feelings of worthlessness, inability to concentrate, and recurrent thoughts of suicide.
- People with bipolar disorder alternate between the hopelessness of depression and the overexcited and unreasonably optimistic state of mania.
- Several biological factors may contribute to anxiety disorders, including heredity and brain function.
- Researchers have identified a number of important social and cognitive influences on the development of mood disorders, including the way we think (attributions) and the situations in which we find ourselves (as with learned helplessness).

Apply What You Know

5. Avin came out of a period of intense depression but now goes days without sleeping, has racing

thoughts, and sets impossible goals for himself. He may be experiencing

a. an anxiety disorder with mood swings.
b. the manic phase of bipolar disorder.
c. post-traumatic stress disorder.
d. the major phase of his major depressive episode.

6. Psychologists studying the development of mood disorders who look for the effects of the way we think, the situations we find ourselves in, and the way we feel are searching for _____ factors that may influence the development of a mood disorder.
7. _____ may occur when we are exposed to unpleasant events over which we have little or no control.
8. True or False: Depressed people make attributions that are stable, internal, and global.

KEY TERMS

anxiety, p. 550
generalized anxiety disorder, p. 551
panic disorder, p. 551
phobia, p. 551
obsessive-compulsive disorder (OCD), p. 551
post-traumatic stress disorder (PTSD), p. 551
major depressive disorder, p. 560
bipolar disorder, p. 561

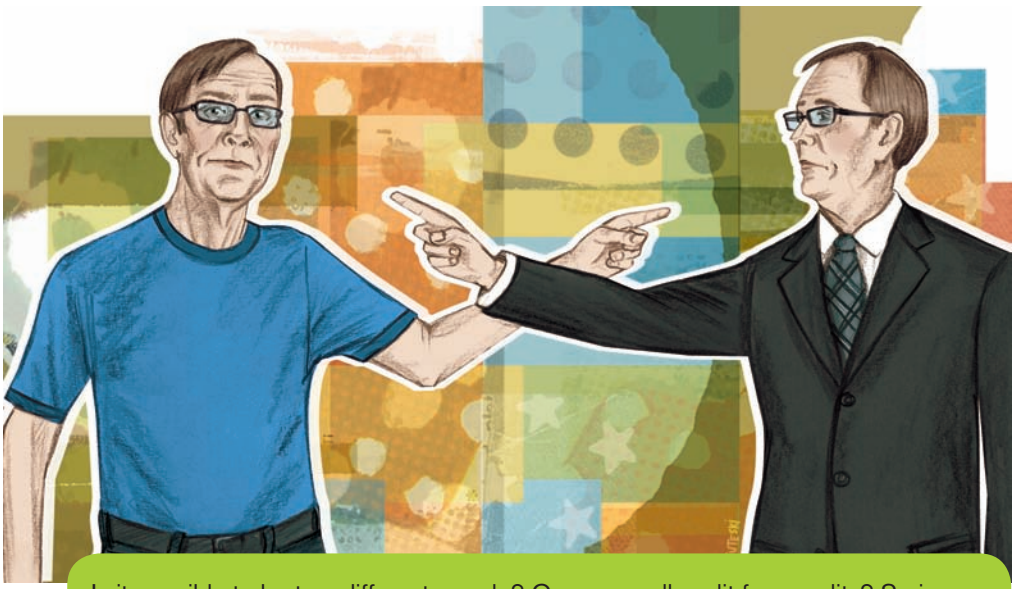
MODULE 32

Dissociative, Schizophrenic, and Personality Disorders

Dissociative Disorders
- Dissociative Amnesia
- Dissociative Fugue
- Dissociative Identity Disorder

Schizophrenic Disorders
- Symptoms of Schizophrenia
- Types of Schizophrenia
- Causes of Schizophrenia

Personality Disorders
- Personality Disorders Related to Anxiety
- Personality Disorders With Odd or Eccentric Behaviors
- Personality Disorders With Dramatic or Impulsive Behaviors



Is it possible to be two different people? Can you really split from reality? Serious psychological disorders are the topic of this module.

Consider Gene Saunders. Gene was a manager at a manufacturing company. Work had become a struggle, with missed production goals, criticism from his supervisor, and disappointment when an expected promotion didn't come through. The stress at work led to additional problems at home, including a violent argument with his teenage son. Two days after the argument, Gene disappeared. A year and a half later, police in a town hundreds of miles away picked up a drifter who had been working as a short-order cook. The drifter's name was Burt Tate, and although Burt knew what town he was in, he had no knowledge of his life before arriving in town. There were no physical or drug problems that would account for the memory loss. You guessed it—Gene and Burt were the same person (Spitzer et al., 1989).

Consider Emilio. His twelfth hospitalization occurred when he was 40 because his mother, with whom he lived, feared him. He dressed in a ragged old coat and bedroom slippers, with several medals around his neck. Much of what he said was simply nonsense. When interviewed, he claimed he had been "eating wires and lighting fires." He alternated from being angry toward his mother to childlike giggling, and he heard nonexistent voices. Emilio had been unable to hold a job since his first hospitalization at age 16 (Spitzer et al., 1989, 2002).

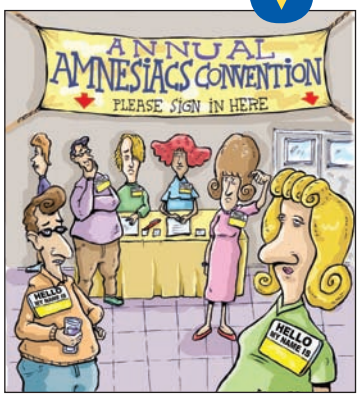
dissociative disorders Disorders in which the sense of self has become separated (dissociated) from previous memories, thoughts, or feelings.

Consider Mary. She was 26 years old when referred for hospitalization by her therapist because she had urges to cut herself with a razor. For more than 10 years, Mary struggled with issues related to religion and philosophy. Her academic performance in college dropped when she began experimenting with a variety of drugs. When Mary entered therapy, she became both hostile and demanding, sometimes insisting on two therapy sessions a day. She did not exhibit stability in her moods or relationships (Spitzer et al., 1989).

Gene, Emilio, and Mary suffer from psychological disorders we discuss in this module. These disorders are not nearly as common as *anxiety disorders* (such as phobias) and *mood disorders* (such as depression), but they represent an interesting sample of the types of disturbances that can plague people. Keep in mind that in this text we do not come even close to examining all disorders—the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision (DSM-IV-TR), lists more than 200 specific mental disorders. Several of the people you read about in this module have lost some aspect of their sense of self like Gene (dissociative disorders). Others have lost contact with reality like Emilio (schizophrenic disorders). And still others have developed lasting and counterproductive patterns of behavior like Mary (personality disorders).

Memory and Your Sense of Self

We often joke about forgetfulness, but the dissociative disorders all involve serious disruption of memory.



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Dissociative Disorders

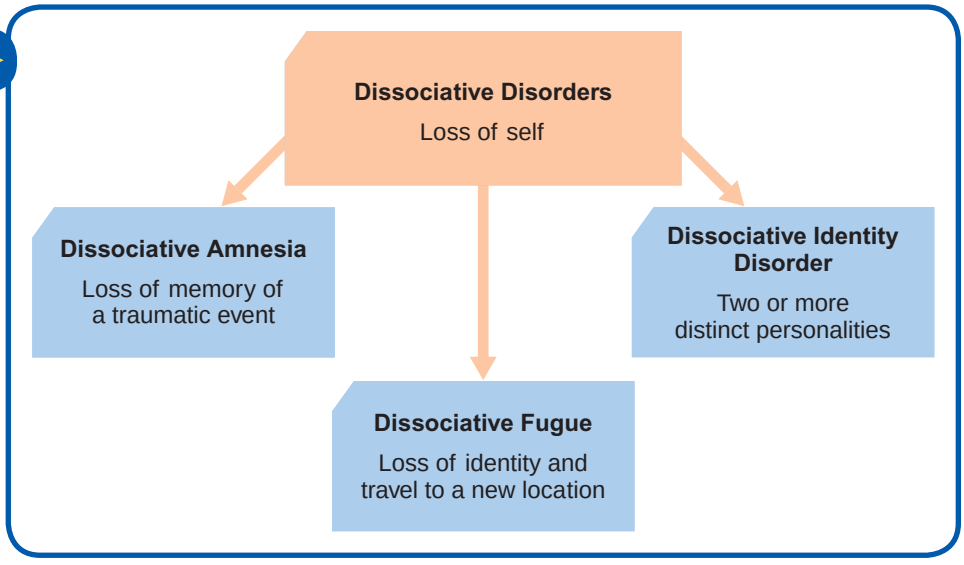
WHAT'S THE POINT?

32-1 What are the symptoms and causes of dissociative disorders?

Dissociate is the opposite of *associate* (to make connections). If a person has a **dissociative disorder,** his sense of self has become separated (dissociated) from his memories, thoughts, or feelings. Dissociative disorders are quite rare and usually represent a response to overwhelming stress. Three specific forms are dissociative amnesia, fugue, and identity disorder (see **Figure 32.1**).

Figure 32.1
Dissociative Disorders

Three dissociative disorders are dissociative amnesia, dissociative fugue, and dissociative identity disorder.


Dissociative Disorders
Loss of self
Dissociative Amnesia
Loss of memory of a traumatic event
Dissociative Identity Disorder
Two or more distinct personalities
Dissociative Fugue
Loss of identity and travel to a new location

Dissociative Amnesia

SCOTT NELSON/GETTY IMAGES

Trauma and Amnesia

People under extreme stress, such as soldiers in combat, may experience dissociative amnesia.

Can you remember the meaning of the word *amnesia?* Amnesia is memory loss, and any number of factors, including drug use, can cause it. Drinking too much alcohol, for example, can lead to a blackout of all memories of the drinking episode. Head injury, fatigue, and physical disorders such as Alzheimer's disease can also cause amnesia. To qualify as **dissociative amnesia,** however, the memory loss must be a reaction to a traumatic event. Serious personal threats are the most common causes of dissociative amnesia. Combat soldiers may report losing their memory for hours or days (van der Hart et al., 1999). Survivors of natural disasters, such as floods or wildfires, sometimes experience similar losses (Kihlstrom et al., 1993).

In one case of dissociative amnesia, an 18-year-old man lost his memory of sailing with friends off the coast of Florida. A storm had come up, and only he had the foresight to put on a life jacket and tie himself to the boat. His friends were swept overboard in the high waves. Because of the emotional trauma, the young man lost all memory of the tragic storm and the several days he spent hoping to be rescued (Spitzer et al., 1989).

Dissociative Fugue

Dissociative fugue is an extended form of dissociative amnesia characterized by loss of identity and travel to a new location. (The word *fugue* comes from the same root as *fugitive.*) A dissociative fugue state can be short, lasting only a few hours, or long, lasting months or even years. The person may develop a new identity, form new friendships, or even enter a new line of work. As with other dissociative disorders, the development of a fugue state is an unconscious response to extreme stress. The case of Gene Saunders at the beginning of this module represents dissociative fugue. His stressful work and home situations led to his disappearance, and even he was not aware of the history behind his transformation into Burt Tate.

Dissociative Identity Disorder

Have you ever felt like a different person? Have you ever said, "I have no idea why I did that"? Magnified to an extreme, these feelings are central features of **dissociative identity disorder** (formerly known as *multiple personality disorder*)—a rare and controversial disorder in which an individual exhibits two or more distinct and alternating personalities. These subpersonalities reportedly can differ in age, sex, and self-perception of physical characteristics. Some researchers have even reported changes in brain function (Elzinga et al., 2007; Putnam, 1991) or handedness (Henninger, 1992) as a patient switches from one personality to another. Sometimes subpersonalities seem to be aware of one another, and sometimes they do not.

dissociative amnesia A dissociative disorder characterized by loss of memory in reaction to a traumatic event.

dissociative fugue A dissociative disorder characterized by loss of identity and travel to a new location.

dissociative identity disorder A rare and controversial dissociative disorder in which an individual exhibits two or more distinct and alternating personalities.

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THE EVERETT COLLECTION

The Media and Mental Disorders

The controversy about dissociative identity disorder has been partially fueled by the public's interest in the disorder. Two classic films—*The Three Faces of Eve* (left) and *Sybil* (right)—have showcased "multiple personality." Some are concerned that these kinds of films and other media attention lead to false diagnoses of this disorder.

Diagnosed cases of dissociative identity disorder increased dramatically in the final decades of the twentieth century. Before the 1970s, fewer than 100 cases had ever been reported in professional journals. Then, in the 1980s alone, reports of more than 20,000 diagnosed cases of dissociative identity disorder appeared, almost all of them in North America (McHugh, 1995). The average number of subpersonalities also increased—from 3 to 12 (Goff & Simms, 1993). In some cases, dozens of personalities were reported.

Psychologists debate whether dissociative identity disorder really exists. Are clinicians simply more knowledgeable about and willing to make the diagnosis? Are better diagnostic rules reducing the number of cases that in the past were misdiagnosed as other disorders, such as schizophrenia? Skeptics believe the power of suggestion has been at work here. Clinicians, who now have read a great deal about these fascinating cases, may unintentionally suggest multiple personalities to their clients (Kihlstrom, 2005). Questions such as "Have you ever felt another part of you is in control?" may lead the patient (who has also read about the disorder or seen depictions on television) to construct subpersonalities in an effort to please the therapist by responding to perceived expectations. This, of course, is also unintentional.

Sybil Dorsett's famous case of dissociative identity disorder was the subject of a book, *Sybil,* and a made-for-TV movie of the same name in 1976 (remade in 2007). However, after the death of Sybil's psychiatrist, a different picture emerged. After reading her recently released records, some experts have come to believe that Sybil's multiple personalities were the result of her therapist's suggestions. By giving names to Sybil's emotional states and asking her to take on these roles as part of the therapeutic process, the psychiatrist could have led Sybil to believe that she possessed multiple personalities. (Other problems that originate in the mind can have physical results, as discussed in Psychology in the Real World: Mind and Body in Psychological Disorders.)

somatoform disorders Psychological disorders in which the symptoms take a bodily form without apparent physical cause.

hypochondriasis A somatoform disorder characterized by imagined symptoms of illness.

PAUSE NOW OR MOVE ON

Turn to page 582 to review and apply what you've learned.

Psychology in THE REAL WORLD

Mind and Body in Psychological Disorders

The relationship between mind and body has fascinated psychologists since this science was born. Psychological disorders are a good place to look for this interaction, because such disorders almost always have both psychological and physical components. This is most dramatic in the **somatoform disorders,** in which the symptoms take a bodily form without apparent physical cause and the reasons behind many visits to the doctor are "medically unexplained" (Johnson, 2008). (*Somatic* comes from a Greek word for "body.")

You're probably already familiar with one of these disorders, **hypochondriasis,** which you may know as *hypochondria,* a somatoform disorder characterized by imagined symptoms of illness (see **Figure 32.2**). People with hypochondriasis experience symptoms of physical illness, such as headaches and fleeting joint pains, but medical exams reveal nothing physically wrong with their bodies. The disorder is, quite literally, all in the mind. People with hypochondriasis suffer, however, because they *believe* they are sick. All of us occasionally have hypochondriacal feelings, worrying that we may be sick but then turning out to be fine. Athletes, who must be tuned in to their bodies, may experience these worries frequently—but not usually to the extent seen in this mind-body disorder. And let's be clear about one more thing: *Pretending* to be sick to avoid responsibility or to gain attention also does not qualify as hypochondriasis.

Another somatoform disorder, *conversion disorder* (formerly called *hysteria*), takes its name from its main symptom—the change, or conversion, of a psychological factor (typically anxiety) into an actual loss of physical function. A person with conversion disorder might suddenly experience blindness, laryngitis, or paralysis that has no physical cause. Have you ever been so frightened you momentarily lost the ability to move, or so stunned you momentarily lost the ability to speak? Then you've experienced, on a minor, short-term level, the core requirement of conversion disorder—loss of function for psychological reasons. Although some disorders, such as major depression, appear to be increasing in modern times, conversion disorder has become quite rare.

The symptoms of hypochondriasis and conversion disorder have no real physical basis. But sometimes psychological factors can lead to or aggravate real medical conditions. Stress, for example, contributes to asthma, ulcers, headaches, and high blood pressure. Such conditions, called *psychophysiological* or *psychosomatic disorders,* involve a more complete interaction of mind and body. With these disorders, as with other somatoform disorders, it's not mind *or* body—it's mind *and* body interacting to produce trouble.

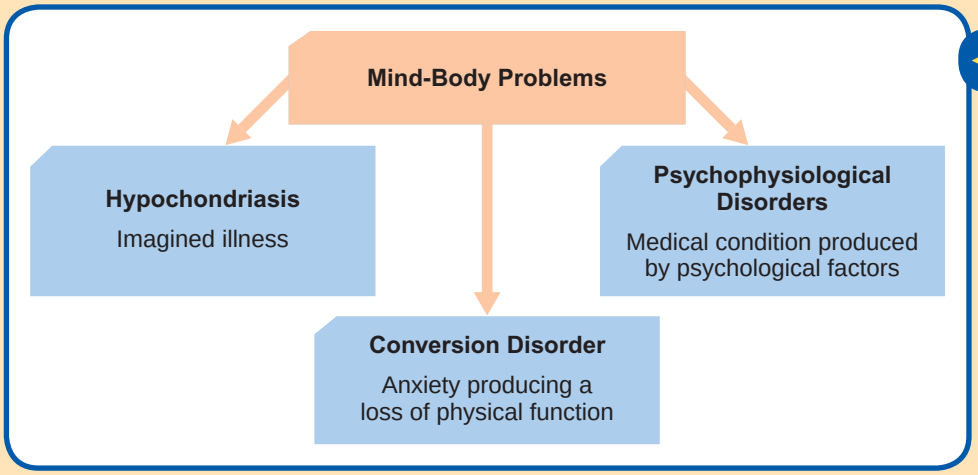


Figure 32.2
Somatoform Disorders

Somatoform disorders include hypochondriasis, conversion disorder, and psychophysiological disorders.

schizophrenia A group of severe disorders characterized by disorganized and delusional thinking, disturbed perceptions, and inappropriate emotions and behaviors.

delusions False beliefs that are symptoms of schizophrenia and other serious psychological disorders.

Schizophrenic Disorders

WHAT'S THE POINT?

32-2 What are the symptoms, types, and causes of schizophrenic disorders?

Schizophrenia is perhaps the most frightening and most misunderstood psychological disorder. Here are some facts to help dispel the myths:

- **Schizophrenia** is not one disorder. It is a family of severe disorders characterized by disorganized and delusional thinking, disturbed perceptions, and inappropriate emotions and behaviors.
- Schizophrenia is not "split personality." *Schiz* does come from a word that means "split," but the split represents a break from reality, not a division of personality. (There is no psychological disorder called *split personality*. Dissociative identity disorder, discussed earlier in this module, comes closest.)
- Schizophrenia occurs in about 1 percent of the world's population (World Health Organization, 2008c). Schizophrenia typically develops in late adolescence or early adulthood and strikes men at a slightly greater rate than it strikes women (Aleman et al., 2003; Picchioni & Murray, 2007).

Symptoms of Schizophrenia

A variety of symptoms characterize schizophrenia (see **Figure 32.3**). No one will experience them all, but everyone with the disorder will experience some of them. Common symptoms include delusions, hallucinations, and inappropriate emotions or behaviors.

Delusions

A **delusion** is a false belief. We all believe false things sometimes, but the delusions of schizophrenia are more extensive, more complex, and often longer term. It may be that these delusions develop initially because individuals with schizophrenia have trouble focusing their attention on

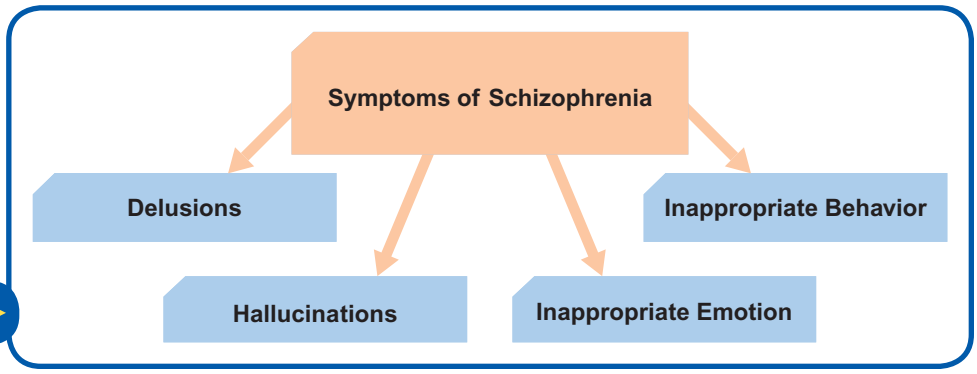


Figure 32.3
Symptoms of Schizophrenia

It would be unusual for a person with schizophrenia to experience all of these symptoms, but some of them will be present.

appropriate environmental stimuli. Instead, their attention may be captured by insignificant things, or they may not notice important ones (Reichenberg & Harvey, 2007). Delusions fall into several broad categories:

hallucinations False perceptions that are symptoms of schizophrenia and other serious psychological disorders.

- *Delusions of grandeur* are false beliefs that you are more important than you really are. People with schizophrenia may actually believe they are someone else, such as a famous political leader (Abraham Lincoln, for example) or religious figure (Jesus).
- *Delusions of persecution* are false beliefs that people are out to get you. A person may believe that she is being followed or that the CIA is engaging in an elaborate plot to capture her.
- *Delusions of sin or guilt* are false beliefs of being responsible for some misfortune. For instance, a person might believe he is responsible for a plane crash because he failed to brush his teeth one morning.
- *Delusions of influence* are false beliefs of being controlled by outside forces: "The devil made me do it."

Hallucinations

A **hallucination** is a false perception. The hallucinations people with schizophrenia most often experience are *auditory.* Many report hearing voices, and sometimes the voices tell them what to do. If the hallucination is *visual,* then the person sees nonexistent objects or distorted images of items or people. *Tactile* hallucinations occur when people feel skin stimulation, such as a tingling or burning or touch that is not real. Hallucinations can also distort *taste* and *smell.* Note the difference: Delusions are beliefs with no logical basis; hallucinations are perceptions with no outside stimulation. But hallucinations often provide "evidence" for delusions—it's quite logical to believe someone is plotting to kill you if you can taste poison in your food. Life becomes unimaginably difficult if we can't trust the input from our own senses.

UNIVERSAL STUDIOS/DREAMWORKS/TOPHAM/THE IMAGE WORKS

Hallucinations

John Nash, the Nobel Prize–winning mathematician featured in the 2001 movie *A Beautiful Mind,* suffered many classic symptoms of schizophrenia, including disturbing hallucinations. In this photo, Nash (played by Russell Crowe) is seeing things that are not there.

Inappropriate Emotions or Behaviors

Many specific symptoms fit into the broad category of inappropriate emotions or behaviors. Schizophrenia can produce wildly inappropriate emotions. A patient might laugh uncontrollably when sadness is called for. Another sufferer might have flat emotions, showing little or no emotional response. Inappropriate behaviors may be verbal or physical. Some people may not speak. Others may produce *word salad,* nonsense talk characteristic of some types of schizophrenia. (Remember Emilio at the beginning of this module? His claim of "eating wires and lighting fires" is one of several symptoms of schizophrenia he exhibits. Can you identify the others? After you have tried, check your answers in the next paragraph.) People with schizophrenia may act in inappropriate ways (examples include speaking too loudly or engaging in odd mannerisms) or be almost completely inactive. In rare cases, *waxy flexibility* occurs, a state in which you could place the person's arm, as you would place a doll's arm, in some position of your choice. The person would hold that position for hours. Quite often, people with schizophrenia withdraw from the affairs of the real

world. This withdrawal further limits their knowledge of current events and their social skills.

Emilio exhibits several symptoms of schizophrenia. We've already established that he is speaking in *word salad.* His bizarre dress is *inappropriate behavior.* His mood swings are *inappropriate emotion.* Finally, the voices he hears are *auditory hallucinations.*

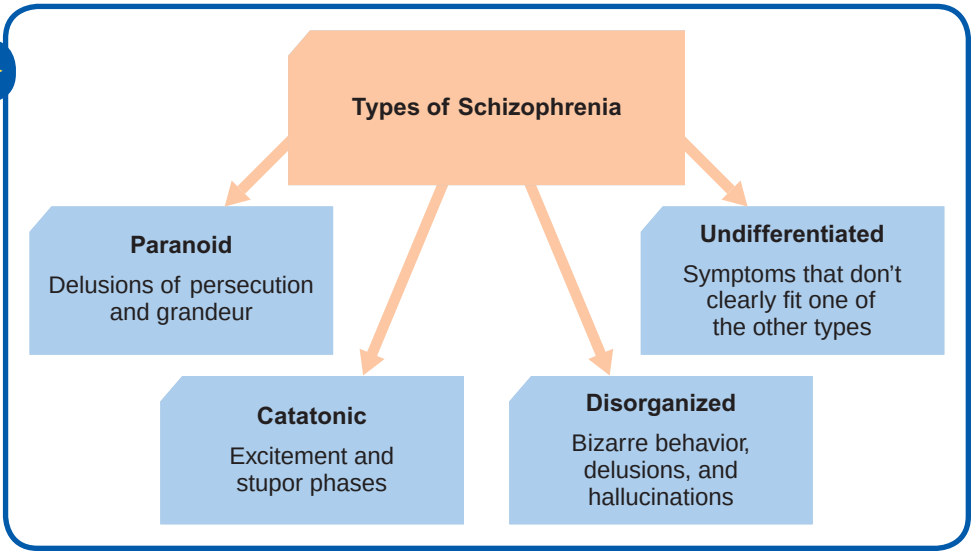
Types of Schizophrenia

The family of disorders known as schizophrenia is broken into four major types—paranoid, catatonic, disorganized, and undifferentiated (see **Figure 32.4**):

- *Paranoid schizophrenia* is characterized by delusions, particularly delusions of grandeur and persecution. Auditory and other hallucinations often support the delusions.
- *Catatonic schizophrenia* is characterized largely by variations in voluntary movements. A person with catatonic schizophrenia alternates between two phases—*catatonic excitement,* consisting of rapid movement, delusions, and hallucinations, and *catatonic stupor,* with little activity or speech. Flat emotion and waxy flexibility often are part of the stupor phase.
- *Disorganized schizophrenia* is characterized by bizarre behavior, delusions, and hallucinations. Individuals with disorganized schizophrenia are visibly disturbed. In historical times, they were thought to have "gone mad." The case of Emilio from the beginning of this module illustrates disorganized schizophrenia.
- *Undifferentiated schizophrenia* is characterized by symptoms that are disturbed but are not clearly consistent with the paranoid, catatonic, or disorganized types of schizophrenia. Nevertheless, individuals with undifferentiated schizophrenia show clear evidence of the symptoms of schizophrenia.

Figure 32.4
Types of Schizophrenia

Schizophrenia is a family of related disorders.



Causes of Schizophrenia

Complex disorders have complicated causes, and there is probably no psychological disorder more complex than schizophrenia. As is often the case, biological factors and psychological factors seem to interact to produce schizophrenia.

Biological Factors The biological approach to schizophrenia has received so much research support in recent years that some experts say we are wrong to call it a psychological disorder. Rather, it is a brain disorder that produces changes in a person's mind. Let's examine the biological factors in more detail.

- *Genetics*—The risk of schizophrenia increases substantially if relatives have the disorder (see **Figure 32.5**). Although roughly 1 percent of the general population has schizophrenia, the risk rises to about 10 percent if a parent or sibling has the disorder. These odds are even higher—almost 50 percent—if the relative with schizophrenia is an identical twin (Plomin et al., 1997). Notice that this evidence shows that, while genetics is an important factor, there is no single gene or set of genes that guarantees schizophrenia will develop. If there were, the risk for an identical twin whose co-twin had the disorder would be 100 percent, because identical twins have identical genes. Instead, genetics seems to produce a *predisposition* for schizophrenia—an increased likelihood that the disorder will develop. The search is on for the specific genes that might combine to alter the brain in a way that produces schizophrenia (Marx, 2007; Millar et al., 2005; Williams et al., 2007). Other factors, as you will see, determine whether the increased likelihood will lead to a full-fledged disorder. A similar situation exists for various kinds of heart disease. Genetics may put a person at risk, but factors such as exercise, diet, and smoking play a critical role in determining whether the disease will develop.

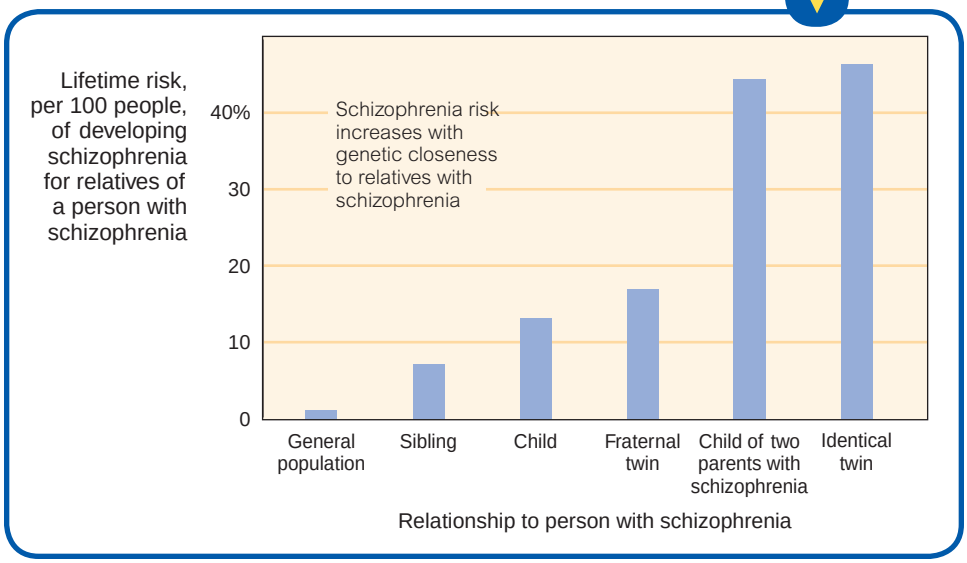


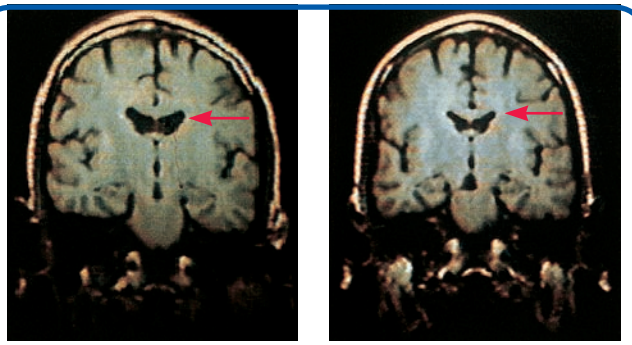
Figure 32.5

Genetics and Schizophrenia: The Genain Quadruplets

Nora, Iris, Myra, and Hester Genain are identical quadruplets that all developed schizophrenia. If they had been randomly selected, the probability of this would be 1 in 100 million. We can assume that no single gene or set of genes is directly responsible for schizophrenia, however. If such a direct cause existed, the figure for identical twins, who are genetically identical, would be 100 percent. Because two of the sisters have more serious forms of schizophrenia, it is likely that both heredity and environment—nature and nurture—are involved. (Adapted from Gottesman, 2001.)

Figure 32.6
Schizophrenia and Brain Structure

These two brain scans are from identical twins, one who has schizophrenia and one who does not. Note that the open space (actually, a cavity in the brain filled with fluid) is larger for the twin with schizophrenia (Suddath et al., 1990). Because identical twins have identical genes, this difference must have been caused by some environmental factor, such as a virus.



Schizophrenia No schizophrenia

FROM SUDDATH, RICHARD L., ET AL. (1990). ANATOMICAL ABNORMALITIES IN THE BRAINS OF MONOZYGOTIC TWINS DISCORDANT FOR SCHIZOPHRENIA. *THE NEW ENGLAND JOURNAL OF MEDICINE* 322, 12. © 1990 BY THE MASSACHUSETTS MEDICAL SOCIETY. PHOTO COURTESY OF DANIEL R. WEINBERGER, M.D., NIH-NIMH/NSC

- *Brain structure*—The brain structure of people with schizophrenia differs markedly from normal brain structure (see **Figure 32.6**). Brain scans show that schizophrenia is often associated with smaller amounts of brain tissue and larger, fluid-filled spaces around that tissue (Wright et al., 2000). Particular brain structures may be affected by schizophrenia. For example, the thalamus, responsible for the routing of incoming sensory information, is smaller when schizophrenia is present and may hinder the person's ability to focus attention (Andreasen et al., 1994).
- *Brain function*—Positive emission tomography (PET) scans, which show the parts of the brain that are active during particular tasks, reveal that the brain of a person with schizophrenia operates differently than does the brain of someone without the disorder. One difference appears in the frontal lobes—the center of our most advanced thinking abilities—which show less activity when schizophrenia is present (Morey et al., 2005; Resnick, 1992). Brain chemistry also differs for a person with schizophrenia. Researchers have discovered as many as six times the normal number of receptor sites for the neurotransmitter *dopamine* when they examined the brains of people with schizophrenia after death (Seeman et al., 1993). This abnormally high number of receptors may explain the delusions and hallucinations associated with schizophrenia. Medication that blocks these receptor sites reduces such symptoms. Researchers are working on medications for another neurotransmitter, glutamate, in an attempt to diminish other symptoms of schizophrenia (Javitt & Coyle, 2004).
- *Prenatal viruses*—A maternal viral infection during pregnancy may cause schizophrenia (Patterson, 2007). The evidence for this is circumstantial but persuasive. Rates of schizophrenia rise for individuals who were born a few months after a flu epidemic (Mednick et al., 1994), and the riskiest birth months in general follow the flu season (Torrey et al., 1997). In the Southern Hemisphere, where the seasons are reversed, the high-risk months are reversed as well (McGrath & Welham, 1999).

Psychological Factors For many years, explanations of schizophrenia focused mainly on psychological factors. Sigmund Freud targeted the relationship between mother and child as the primary cause of the disorder. He mistakenly thought that mothers who were cold, domineering, and selfish caused schizophrenia in their children (Fromm-Reichmann, 1948).

Are there any psychological factors that *do* appear important? The two areas that seem most significant are stress and disturbed family communication patterns. Recall that the major genetic contribution to schizophrenia seems to be a predisposition—a tendency to develop the disorder. Stress may be the trigger that sets off the series of events that converts schizophrenia from a possibility into a reality. Disturbed family communications are also correlated with the development of schizophrenia, but at this point it's impossible to tell whether they are a *cause* of schizophrenia or a *result* of the disorder. One study did find that young people who developed schizophrenia were more likely to be socially withdrawn and to exhibit odd behavior before becoming schizophrenic (Johnstone et al., 2005).

The bizarre world of schizophrenia has puzzled and fascinated students of human behavior for centuries. We are making progress both in understanding and in effectively treating this devastating disorder. It seems to result from a complex interaction of biological and psychological factors. To be effective, treatment must address both of these components.

personality disorders Psychological disorders characterized by rigid and lasting behavior patterns that disrupt social functioning.

PAUSE NOW OR MOVE ON

Turn to page 582 to review and apply what you've learned.

Personality Disorders

WHAT'S THE POINT?

32-3 What kinds of personality disorders are known?

Personality disorders are lasting, rigid behavior patterns that disrupt social functioning. The DSM-IV-TR lists 10 personality disorders divided into three clusters—related to anxiety, odd or eccentric behaviors, and dramatic or impulsive behaviors (see **Figure 32.7**). The specific personality disorders

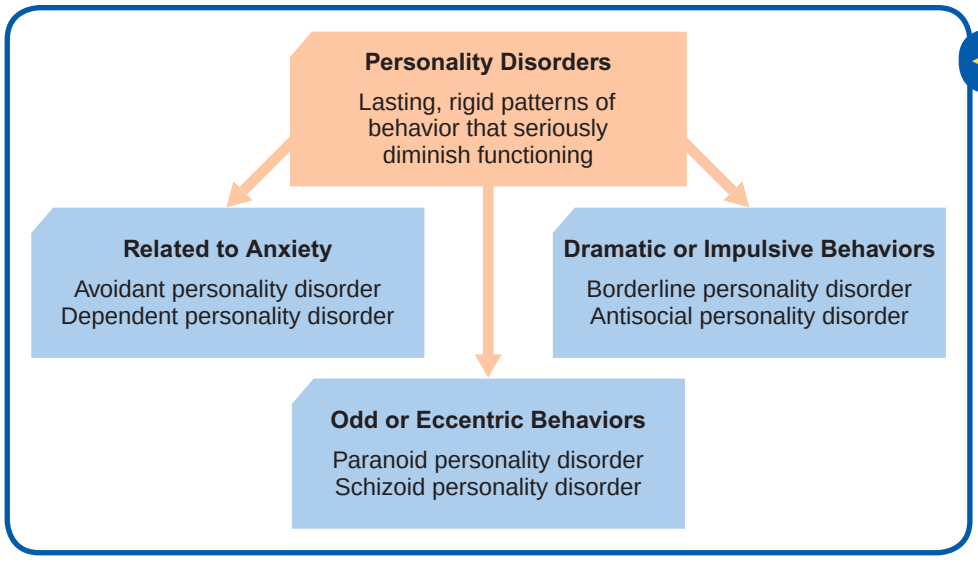


Figure 32.7
Clusters of Personality Disorders

The main clusters of personality disorders relate to anxiety, odd or eccentric behaviors, and dramatic or impulsive behaviors.

are often difficult to diagnose because there is a lot of overlap among them. Because of the difficulties that mental health professionals have had in using the current categories of personality disorders, it is quite likely that this area will undergo significant change in the DSM-5, the new edition of the official diagnostic and classification system that is expected in 2013 (American Psychiatric Association, 2010; Clark, 2007; Widiger & Trull, 2007). The behavior patterns are usually evident by adolescence and obvious to others, but the person with the personality disorder often does not recognize the problem exists, which can make treatment difficult. Let's take a look at the three clusters of personality disorders and a sample of the specific disorders included in each cluster.

Personality Disorders Related to Anxiety

Individuals with *avoidant personality disorder* are so sensitive about being rejected that personal relationships become difficult. Those with *dependent personality disorder* behave in clingy, submissive ways and display a strong need to have others take care of them. Juanita, for example, is a 28-year-old with dependent personality disorder. She still lives with her mother and feels unable to live in her own apartment because she has trouble making decisions about day-to-day life. She needs constant reassurance from her mother and is afraid to disagree with her parent because she wants to avoid criticism.

Personality Disorders With Odd or Eccentric Behaviors

Individuals with *paranoid personality disorder* (which is different from paranoid schizophrenia) show deep distrust of other people. This suspiciousness gets in the way of personal relationships. Those with *schizoid personality disorder* are detached from social relationships. They are the true hermits, preferring the life of the loner and avoiding intimate interactions with others at all costs. Henry is such a person. He does most of his shopping online because he doesn't like having to talk to clerks in stores. He has always lived on his own and does not attend any family holiday celebrations despite repeated invitations from relatives. He does not own a telephone.

Personality Disorders With Dramatic or Impulsive Behaviors

Those with *borderline personality disorder* exhibit, above all else, instability—of emotions, self-image, behavior, and relationships. Mary, whose story is one of the cases that opens this module, is an example of a person with borderline personality disorder. Her academic struggles in college, inability to resolve religious and philosophical issues, unrealistic demands, and self-cutting all add up to a life filled with instability.

The Criminal Brain

Biological factors may help explain the criminal behavior of individuals with antisocial personality disorder. PET scans show reduced activity in the frontal lobes of a murderer. This may result in a lack of judgment and less ability to control impulsive or aggressive tendencies.

People with **antisocial personality disorder** (also known as psychopathic or sociopathic personality disorder) show a lack of conscience for wrongdoing and a lack of respect for the rights of other people. Antisocial personality disorder is the most dramatic and troubling of all personality disorders. Because of this lack of conscience, people with this disorder are willing to engage in wide-ranging criminal behaviors about which they show no remorse. This disorder is more likely to occur in males than in females, and it usually develops by adolescence (Cale & Lilienfeld, 2002). People with the disorder are often charming and clever, which helps them get away with their misdeeds. In extreme forms, antisocial personality disorder may manifest itself in serial killing, where the murderer has no regard for the victims (think of Hannibal Lecter in the 1991 film *The Silence of the Lambs*). Vicious crimes are committed for trivial reasons and dismissed with such excuses as "Once I've done a crime, I just forget it" or "I think of killing like smoking a cigarette, like another habit" (Darrach & Norris, 1984). The horribly counterproductive behavior patterns of antisocial personality are caused by a combination of biological, psychological, and social factors. Once in place, the disorder is extremely difficult to treat effectively. As you can imagine, people with antisocial personality disorder often end up in jail instead of in treatment.

antisocial personality disorder A personality disorder in which the person (usually a man) shows a lack of conscience for wrongdoing and a lack of respect for the rights of others.

PAUSE NOW OR MOVE ON

Turn to page 582 to review and apply what you've learned.

Dissociative disorders, schizophrenic disorders, and personality disorders help us understand that abnormal functioning is as varied as normal functioning and that the reasons for it are just as complex. Just as psychology can help us understand and promote productive behavior and mental processes, it can also help us comprehend the fascinating and sometimes frightening world of mental disorders. This is the first step on the road to effective treatment.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 32

Thinking About Dissociative, Schizophrenic, and Personality Disorders

Dissociative Disorders

WHAT'S THE POINT?

32-1 What are the symptoms and causes of dissociative disorders?

- Dissociative amnesia is memory loss caused by a reaction to a traumatic event.
- Dissociative fugue is an extended form of dissociative amnesia characterized by loss of identity and travel to a new location.
- Dissociative identity disorder (formerly known as multiple personality disorder) is a rare and controversial disorder in which an individual exhibits two or more distinct and alternating personalities.
- Dissociative disorders are usually a response to overwhelming stress. They cause individuals to lose their sense of self and separate (dissociate) from their memories, thoughts, or feelings.

Apply What You Know

1. Psychologists skeptical about the increase in the number of people diagnosed with dissociative identity disorder believe the increase is likely due to
   a. better diagnostic criteria.
   b. an increase in severe child abuse.
   c. genetic factors that may trigger the disorder.
   d. therapists who "cause" the disorder through suggestion.
2. True or False: Dissociative amnesia is often caused by drug use or head injuries.

Schizophrenic Disorders

WHAT'S THE POINT?

32-2 What are the symptoms, types, and causes of schizophrenic disorders?

- Schizophrenic disorders include symptoms of delusions, hallucinations, and inappropriate emotions or behaviors.
- The main types of schizophrenia are paranoid schizophrenia, catatonic schizophrenia, disorganized schizophrenia, and undifferentiated schizophrenia.
- The risk of schizophrenia increases substantially if biological relatives have the disorder, indicating a genetic predisposition for the development of schizophrenia. Brain structure, brain function, and maternal viral infection during pregnancy may also contribute to schizophrenia.
- The psychological factors of stress and disturbed family communication patterns may be triggers for the underlying biological factors that cause a person to manifest schizophrenic symptoms.

Apply What You Know

3. Delusions of persecution and grandeur characterize _____ schizophrenia.
4. Briefly describe two biological factors that are associated with the development of schizophrenia.

Personality Disorders

WHAT'S THE POINT?

32-3 What kinds of personality disorders are known?

- Personality disorders are lasting, rigid behavior patterns that disrupt social functioning.
- Personality disorders are divided into three clusters related to anxiety, to odd or eccentric behaviors, and to dramatic or impulsive behaviors.
- Antisocial personality disorder involves a lack of conscience and a lack of respect for the rights of other people.

Apply What You Know

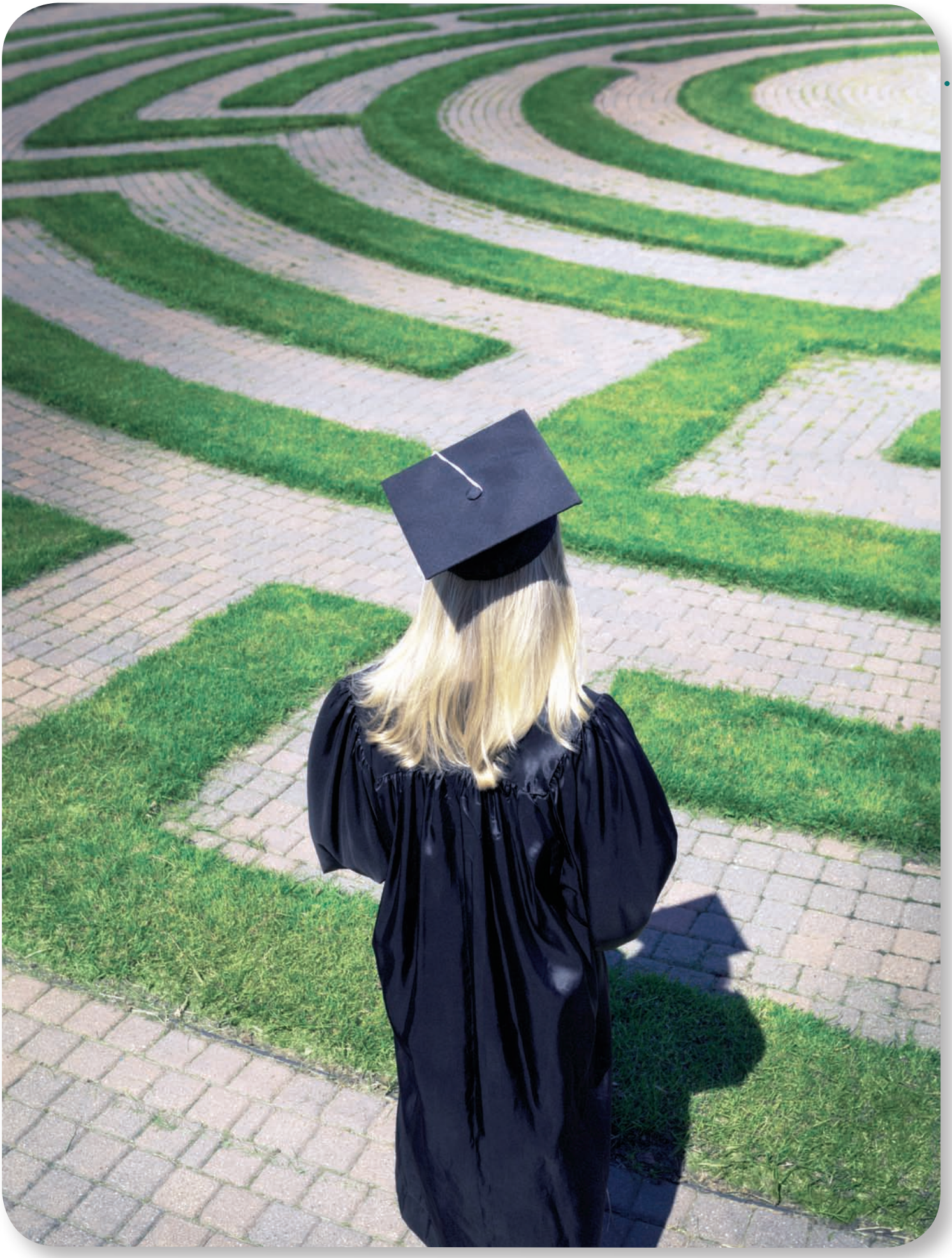
5. True or False: Personality disorders usually involve patterns of behavior that are obvious to others by the time an individual is a teenager.

6. Individuals with a deep distrust of others might be diagnosed with _____ personality disorder.

   a. paranoid
   b. avoidant
   c. borderline
   d. antisocial

KEY TERMS

dissociative disorders, p. 570
dissociative amnesia, p. 571
dissociative fugue, p. 571
dissociative identity disorder, p. 571
somatoform disorders, p. 573
hypochondriasis, p. 573
schizophrenia, p. 574
delusions, p. 574
hallucinations, p. 575
personality disorders, p. 579
antisocial personality disorder, p. 581



DOMAIN 7

Applications of Psychological Science

Treatment of Psychological Disorders

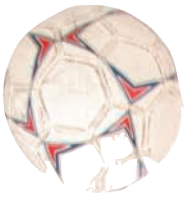
MODULE 33 Psychological Therapies

MODULE 34 Biomedical Therapies

Stress and Health

MODULE 35 Effects of Stress

MODULE 36 Promoting Wellness



In a perfect world, everybody thrives, flourishes, and lives a life filled with happiness. However, we all know the world is not perfect. From time to time, we hit low spots that can knock us down. When the low spots become too much to handle on our own, turning to a psychologist for support, counsel, or therapy can help us get back up.

Modules 33 and 34 in this final Applications of Psychological Science Domain explore the psychological science behind the different kinds of psychological and biomedical therapy that clinical psychologists and others use to help people get back on their feet. Then, in the next two modules, we examine the link between stress and illness and explore how certain behaviors and thoughts can improve health and wellness. Module 35 discusses the kinds of stress that can throw us for a loop, and we end in Module 36 with the science behind how to thrive and flourish. Increase your thriving, and you'll likely decrease the chance that hard times will get the better of you.

So, let's get started with a look at different kinds of psychological treatment psychologists use to alleviate psychological disorder.

Treatment of Psychological Disorders

MODULES

33 Psychological Therapies

34 Biomedical Therapies

Have you ever had back problems? It's one thing to know that your back hurts but something entirely different to know what to do about it. Maybe special exercises are the answer, or perhaps losing a few pounds would reduce stress on the spine. Maybe a trip to the chiropractor or the use of a back brace is in order. Maybe you should even consider surgery.

The point is that even when you have identified a problem—whether it's a physical problem such as a backache or a psychological problem such as depression—there are likely to be several options for treatment. Here we begin by presenting some treatments available for psychological disorders. Module 33 focuses on treatments with a psychological basis, and Module 34 highlights therapy through drugs or medical procedures available from physicians. As you'll soon see, psychologists have found that some treatments are particularly effective for certain disorders.

MODULE 33

Psychological Therapies

Psychoanalysis
- Psychoanalytic Assumptions
- Psychoanalytic Methods
- The Psychodynamic Perspective

Humanistic Therapies

Behavior Therapies
- Classical Conditioning Techniques
- Operant Conditioning Techniques

Cognitive Therapies

Family and Group Therapies

Psychotherapy comes in many forms. One of the earliest therapists, Sigmund Freud, had patients lie down during therapy sessions. Is this approach common? How many different approaches are there? Let's take a look.

When you think of *therapy,* what do you envision? Perhaps you see someone lying on a couch reflecting on childhood memories while a therapist listens and takes notes. **Sigmund Freud** devised this once-innovative mode of healing over 100 years ago, and for many Americans, this image represents a prototype for therapy. Although traditional Freudian-style therapy is still popular in movies and cartoons, only a few key remnants of his methods can be found in a therapist's office today.

Have you ever wondered whether therapy of any kind really works? Psychologists concerned with this question have developed many approaches in their attempt to help people cope with psychological problems. As a result, therapists can select from a variety of techniques to find the one best suited to resolving a particular problem.

Therapy sometimes involves prescription medications and even medical procedures in severe cases, but more often, it involves nonmedical options, which are the

KEYSTONE PICTURES USA/ALAMY

SIGMUND FREUD (1856–1939) Founder of psychoanalysis, a controversial theory about the workings of the unconscious mind.

focus of this module. Psychological therapy, or **psychotherapy,** is an interaction between a trained therapist and someone who is seeking to overcome psychological difficulties or achieve personal growth (Frank, 1982; Myers, 2011). All told, there are around 250 types of psychotherapy (Parloff, 1987). But each centers on one or more of four major approaches: psychoanalytic, humanistic, behavioral, and cognitive. Depending on the person's problems, a therapist may use techniques from various forms of therapy in an **eclectic approach.**

We begin our explanation of psychotherapy by considering the four individual perspectives and then exploring how families and groups may benefit from going through therapy together. Let's start with the first comprehensive approach to therapy, Freud's psychoanalysis.

Psychoanalysis

WHAT'S THE POINT?

33-1 What is psychotherapy in general, and what is Sigmund Freud's psychoanalytic theory in particular?

Few therapists practice psychotherapy the way Freud did at the turn of the century, but his influence is easy to spot in the treatment methods of several current therapies. Let's take a closer look at Freud's **psychoanalysis** so that we can better understand its broad influence.

Psychoanalytic Assumptions

Freud liked to compare personality to an iceberg composed of three primary elements: the pleasure-seeking *id,* the reality-oriented *ego,* and the *superego,* a set of internalized ideals (the conscience). Just as most of an iceberg floats beneath the water and is invisible, so the greater portion of personality is impossible to see (as shown in Figure 28.1 in Module 28). The waterline separating the visible parts of personality from the invisible parts, Freud said, is the boundary between the conscious and the unconscious regions of our mind. We are conscious of the portion of personality above the waterline but not of the portion below.

The iceberg represents the structure of personality. But how does personality develop? According to Freud, personality forms during our early childhood, when we pass through a series of stages, such as the oral stage (0 to 18 months) and the anal stage (18 to 36 months). Each stage is a time of potential conflicts, and failure to adequately resolve these conflicts, Freud believed, could result in problems in later adult years. For instance, the child who does not resolve conflicts at the oral stage might wind up as a smoker. Relief from these psychological problems is possible, Freud believed, if the analyst helps patients bring the repressed, unconscious conflicts and impulses of childhood to the surface, or into the conscious mind. Freud thought that *insight*

psychotherapy An interaction between a trained therapist and someone who is seeking to overcome psychological difficulties or achieve personal growth.

eclectic approach An approach to psychotherapy that, depending on the person's problems, uses techniques from various forms of therapy.

psychoanalysis Freud's theory of personality; also, a therapeutic technique that attempts to provide insight into thoughts and actions by exposing and interpreting the underlying unconscious motives and conflicts.

into the origin of the psychological disorder would allow the person to work through previously buried feelings. Wellness and health, according to this theory, result from the release of the energy previously (and unconsciously) devoted to resolving these conflicts.

resistance In psychoanalysis, the blocking from consciousness of anxiety-laden material.

interpretation In psychoanalysis, the analyst's noting of ideas on the meaning behind dreams, resistances, and other significant behaviors to promote insight.

transference In psychoanalysis, the patient's transfer of strong emotions (such as love or hatred) linked with other relationships to the analyst.

Psychoanalytic Methods

Psychoanalysis aims to dig up the past to clarify the present. Analysts dig with several different therapeutic tools, and one of the most useful is *free association*. How does free association work? First, the analyst asks the patient to relax, perhaps reclining on a couch, with the head slightly elevated. The analyst, seated nearby, may ask the patient to think of a childhood memory as a starting point and to talk about whatever comes to mind—perhaps a favorite game, childhood friends, or dreams.

That may sound easy, but what if you were the patient and you thought of something embarrassing? Would you hesitate before talking about it? Would you leave something out of your story, change the subject, or joke your way out of the situation? A psychoanalyst would probably classify all of these free association interruptions as **resistance,** or the blocking from consciousness of anxiety-laden material. It is the analyst's job to make patients aware of these sensitive areas and to offer **interpretation,** ideas on the meaning behind dreams, resistances, and other significant behaviors to promote insight. Why did you stop in the middle of a story about your father? Is there an unresolved childhood conflict buried in your memory? Analysts dig for these conflicts and the meaning underneath them.

Freud thought dreams were a rich source of information about unconscious conflicts. He called them the "royal road to the unconscious." Dream analysis is a key element of the psychoanalytic process, and Freud was particularly interested in the *latent content,* or censored meaning, of dreams. This was why Freud spent so much time trying to figure out what his patients' dreams *really* meant. Did that dream about being trapped in a room really mean that the patient felt stuck in a bad relationship?

Freud recognized that patients transfer strong emotions (such as love or hatred) linked with other relationships to the analyst, a process he called **transference.** Freud felt that patients could gain insight into current and past relationships by exploring these transferred feelings for their analyst and dealing with the long-repressed issues they represent.

Freud's ideas have inarguably influenced therapy, but contemporary critics of psychoanalysis note several problems with Freud's methods:

- The foundation of psychoanalysis rested on Freud's belief in *repressed memories.* However, many psychologists doubt that we repress important memories. This topic has sparked intense debate.
- Traditional psychoanalysis is expensive, requires several sessions a week, and can last for years. With sessions typically

Costs of Therapy

Traditional psychoanalytic therapy typically costs more than $100 per session and continues for months, even years. Insurance companies will not cover so many sessions, and few people can afford it on their own.

RICHARD NOWITZ/PHOTO RESEARCHERS, INC.

Psychology in THE REAL WORLD

Are Alternative Therapies Effective?

You may have noticed that we haven't yet discussed many of the therapy techniques you see advertised in the media. Have you heard of aromatherapists, reflexologists, or anger-release therapists? Princess Diana of England sought psychological relief from representatives of all three (Smith, 1999). The world is filled with would-be healers making claims that do not stand up to scientific research. Here, at least as much as anywhere else, you will need to apply your critical thinking skills to assess such claims. Testimonials and popular interest aside, what does the evidence say about alternative therapies? Let's take a closer look at one of them: light-exposure therapy.

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Light-Exposure Therapy

Some call it the wintertime blahs. Others call it the cold weather blues. Therapists recognize this legitimate form of depression as *seasonal affective disorder* (SAD). Whatever you call it, the feelings accompanying this condition seem to result from the decreased amount of sunlight during the winter months.

About 20 years ago, therapists working for the National Institute of Mental Health came up with a treatment idea. What if SAD patients received a daily dose of bright light? Would the extra light nudge their natural body rhythms back into a normal pattern? Clinical studies indeed reported that light brought relief from the winter blues. Now you can buy or rent light boxes to increase your exposure to light and brighten your winter days. But wait a minute. Doesn't this sound like yet another example of an *expectation effect* ("I feel better because I thought I would feel better")? In this case, additional research has shown that there is more to light-exposure therapy than meets the eye.

costing more than $100 per visit, this kind of therapy is available only to the wealthy.

- Refuting psychoanalytic interpretation gets you nowhere. If you disagree with the interpretation, your analyst might say, "Ah, more resistance. You confirm my interpretation." And if you agree, well, you might hear something like "Ah, no more resistance. You confirm my interpretation." The analyst does not lose many arguments.

The Psychodynamic Perspective

Although few therapists practice strict psychoanalysis today, Freud's innovative techniques for healing have broadly influenced the work of many of them. These therapists make *psychodynamic assumptions* (that is, assumptions related to psychoanalysis). They try to understand a person's problems by looking at childhood experiences, unconscious drives, and unresolved

One of these studies exposed SAD patients to either bright light treatments or to a phony placebo treatment (a "negative ion generator"). Investigators displayed equal enthusiasm about each treatment. After four weeks, 61 percent of the participants receiving bright light in the morning had improved tremendously, but only 32 percent of those receiving "negative ion" treatment had improved (Eastman et al., 1998). Alfred Lewy and his colleagues (1998) reported a biological link between morning light exposure and levels of melatonin, a hormone that plays a role in body rhythm regulation. It turns out that increased exposure to light was indeed a bright idea for treating people with SAD.

Note that applying scientific reasoning and critical thinking while considering new claims does not necessarily mean you will debunk the claim. But it does mean you will know with more confidence whether the claim has merit.

Those who seek therapy usually feel better after getting help. And there are people who could use professional therapy, do not seek it, but recover anyway. This spontaneous recovery ability shows that humans are resourceful and that we have a capacity to care for one another. Still, we know that those who receive therapeutic help are more likely to get well than those who do not. Effective therapists possess empathy for their clients, show care and concern, listen respectfully, and reassure. They help make hope available for those who have lost hope while providing a perspective on life that is fresh and believable.

BRYAN & CHERRY ALEXANDER PHOTOGRAPHY

Seasonal Affective Disorder

Those with seasonal affective disorder have shown improvement when exposed to bright lights.

conflicts. But those working from a psychodynamic perspective today are more likely to request weekly meetings for only a few months, in contrast to Freud's recommendation of several meetings weekly for many years.

Freud's techniques have also influenced *interpersonal psychotherapy.* Therapists using this 12- to 16-session method try to foster insight into the origins of a problem, but they focus on what's going on in the patient's life *now,* rather than trying to untie the knots of a long-ago childhood conflict. Interpersonal therapy asks how current relationships can be mended and social skills improved. This attempt to find relief for symptoms caused by today's conflicts has proved effective against depression (Weissman, 1999).

To see how psychoanalytic, psychodynamic, and interpersonal therapies differ, consider the case of Serena, a college senior two months from graduation. She has been going out with the same person for two squabble-free years, but recently they've been having regular disagreements. Serena has developed trouble sleeping, and she reports feeling easily irritated and depressed. How would therapists from the three approaches treat Serena?

- A psychoanalyst would want to delve completely into Serena's childhood over the course of many visits. The analyst might ask her about her dreams or watch to see whether she transfers her feelings toward the boyfriend to the analyst.
- A psychodynamic therapist would also be interested in Serena's childhood and how that may be affecting her relationships, but this therapist would meet with Serena in far fewer sessions and would focus more on her current issues.
- An interpersonal therapist would also seek insight but would encourage Serena to think almost exclusively about her current symptoms and problems. Thus, attention might focus on how she can assess the relationship, resolve disputes with her boyfriend, and better express her emotions.

Before moving on to the next perspective, take a look at the wider world of psychological therapy in Psychology in the Real World: Are Alternative Therapies Effective?

PAUSE NOW OR MOVE ON

Turn to page 604 to review and apply what you've learned.

Humanistic Therapies

WHAT'S THE POINT?

33-2 How do humanistic therapists try to help people with emotional problems?

CARL ROGERS (1902–1987) Humanistic psychologist who developed client-centered therapy and stressed the importance of acceptance, genuineness, and empathy in fostering human growth.

To a humanistic therapist, the potential for self-fulfillment already exists in each of us. Humanistic therapy aims to promote self-fulfillment by increasing self-acceptance and self-awareness. The humanistic approach to therapy differs from the psychoanalytic approach by

- fostering growth instead of relieving illness; thus, these therapists refer to people in therapy as "clients," not "patients."
- focusing on the present and future instead of the past.
- emphasizing conscious thoughts instead of unconscious thoughts.

Humanistic therapists typically use *nondirective* methods: Therapists listen without interpreting and do not direct clients to any particular insight. **Carl Rogers** developed the most famous form of humanistic therapy. His **client-centered therapy** uses active listening within a genuine, accepting, and empathic environment to facilitate the client's growth. Rogers believed that for client-centered therapy to be successful, therapists must provide a supportive environment that includes **active listening,** where the therapist echoes, restates, and then clarifies the client's thoughts and feelings:

client-centered therapy A humanistic therapy, developed by Rogers, in which the therapist uses techniques such as active listening within a genuine, accepting, empathic environment to facilitate the client's growth.

active listening Empathic listening in which the listener echoes, restates, and clarifies.

MICHAEL ROUGIER/TIMEPIX

Carl Rogers

The psychologist (far right) is actively listening to a client during this client-centered group therapy session.

- *Echoing feelings*—The therapist mirrors the feelings of the client with statements like "That must really be frustrating."
- *Restating*—The therapist uses the words of the client to summarize the conversation.
- *Clarifying*—The therapist encourages the client to say more by asking questions like "Could you give me an example of what you're saying?"

The following excerpt is an example of an interaction between a Rogerian therapist and a client. See if you can spot where the therapist echoes, restates, and clarifies feelings (Duke & Nowicki, 1979, p. 565):

Client: I really feel bad today . . . just terrible.
Therapist: You're feeling pretty bad.
Client: Yeah, I'm angry and that's made me feel bad, especially when I can't do anything about it. I just have to live with it and shut up.
Therapist: You're very angry and feel like there's nothing you can safely do with your feelings.
Client: Uh-huh. I mean . . . if I yell at my wife, she gets hurt. If I don't say anything to her, I feel tense.
Therapist: You're between a rock and a hard place—no matter what you do, you'll wind up feeling bad.
Client: I mean she chews ice all day and all night. I feel stupid saying this. It's petty, I know. But when I sit there and try to concentrate I hear all these slurping and crunching noises. I can't stand it . . . and I yell. She feels hurt—I feel bad—like I shouldn't have said anything.
Therapist: So when you finally say something you feel bad afterward.
Client: Yeah, I can't say anything to her without getting mad and saying more than I should. And then I cause more trouble than it's worth.

The therapist is accepting and understanding while becoming this client's psychological mirror. The goal is for the client to be able to see himself more clearly at the conclusion of therapy.

Can therapy be *completely* nondirective? That is, should a therapist stick to echoing and restating statements by the patient to be successful? Rogers said

No, adding that nondirectivity was not the key element of therapy. Rather, the client should feel *unconditional positive regard,* a feeling of being accepted that does not depend on any specific behaviors. This feeling will follow, Rogers believed, from the therapist's nonjudgmental, accepting environment. Unconditional positive regard allows clients to feel valued and to accept themselves.

If you want to become a more active listener in your relationships, look back at the three suggestions Rogers made to achieve this result. Active listening is not reserved only for therapists. Think of your best friends. Chances are, you like them because they are good listeners.

PAUSE NOW OR MOVE ON

Turn to page 605 to review and apply what you've learned.

Behavior Therapies

WHAT'S THE POINT?

33-3 How do behavior therapists apply the principles of classical conditioning and operant conditioning?

Say you have a fear of dogs. A psychoanalyst might try to trace this fear to some unresolved childhood conflict. A humanistic therapist might offer you unconditional positive regard while helping you get in touch with your feelings. Behavior therapists would reject both of these approaches and instead attempt to replace your fearful thoughts and related behaviors with constructive, relaxing thoughts and actions. **Behavior therapy** applies learning principles to the elimination of unwanted behaviors. Both classical conditioning and operant conditioning principles have contributed to the behavior therapy methods.

behavior therapy Therapy that applies learning principles to the elimination of unwanted behaviors.

Orientations

The psychoanalytic (Freudian) therapist may ask questions about childhood, whereas the behavior therapist asks about current actions and activities.

What's the nature of the trouble and when did it begin?
Let's drive it around and see what happens.
FREUDIAN
BEHAVIOR THERAPIST
© 2003 SIDNEY HARRIS

Classical Conditioning Techniques

systematic desensitization A type of counterconditioning that associates a pleasant, relaxed state with gradually increasing, anxiety-triggering stimuli.

Classical conditioning is a type of learning in which we associate two things that occur together. Classical conditioning pioneer John B. Watson showed that we can learn to associate most emotions with behaviors, such as fear with public speaking. If we can learn such fears, can we "unlearn" them? In some cases, *Yes,* through the process of *counterconditioning,* a behavior therapy technique that teaches us to associate new responses to places or things that have in the past triggered unwanted behaviors. Two popular counterconditioning techniques are systematic desensitization and aversive conditioning.

Systematic Desensitization

Think of something that makes you feel anxious. Perhaps it's a difficult test you have to take, the opening night of a show you're in, or the first minute of an athletic contest you've suited up for. Now, imagine the most relaxing place for you on Earth. Is it a secluded beach on a beautiful, sunny day? A quiet valley in the mountains? A hillside close to a pond? Now, can you think of the anxious situation and the relaxing situation at the same time? If you're like most people, you won't be able to. You might be able to alternate between the two settings quickly, but you won't be able to imagine both simultaneously. The most widely used behavior therapy is based on just this idea: You can't feel relaxed and anxious at the same time. **Systematic desensitization** is a type of counterconditioning that associates a pleasant, relaxed state with gradually increasing, anxiety-triggering stimuli (Jones, 1924; Wolpe, 1958; Wolpe & Plaud, 1997). If you can repeatedly relax when faced with increasingly higher levels of the anxiety-producing stimulus, you can gradually overcome your problem. This technique is commonly used to treat phobias, so we can apply it to a common fear: flying in an airplane.

A behavior therapist using systematic desensitization may start by having you write down a hierarchy of anxiety-triggering flying situations. Your fear-of-flying hierarchy would include a range of situations from least to most anxiety provoking. What flying-related event would cause you the worst anxiety? How about being seated in an airplane while it takes off? If so, this would be the bottom item on your list. And what flying-related event would cause little anxiety? Perhaps looking at an airplane from a mile away? This would be the top item on your list.

After establishing your hierarchy, you would be trained to relax using *progressive relaxation.* With this technique, you learn to relax different sets of muscle groups until you approach a near-complete state of relaxation. While you are in that state, your therapist tells you to close your eyes and to imagine the first (least troublesome) item on your hierarchy. If imagining this scene causes you to feel anxious, you signal by raising an index finger. The therapist then instructs you to quit thinking about the situation and to practice deep relaxation again. You repeat these steps until imagining the scene does not cause anxiety. At that point, you move to the second situation on your hierarchy—perhaps looking at a photo of a plane

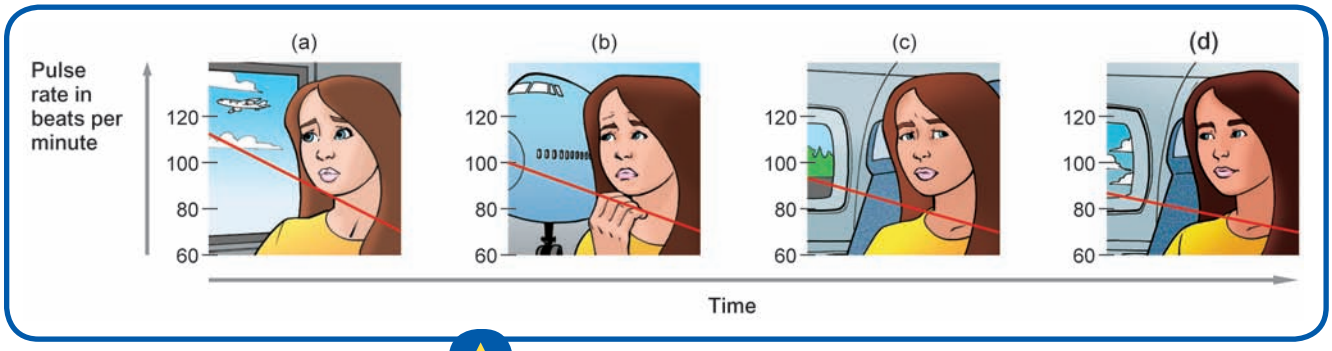


Figure 33.1
Systematic Desensitization

Systematic desensitization helps people overcome fears, such as a fear of flying. Patients work through a hierarchy of anxiety-producing events associated with flying and learn to relax at each level of the hierarchy. For instance, once the photo of an airplane no longer produces anxiety (a), the person with the fear may go to an airport and look at a real airplane from far away (b). Eventually, the patient works up to touching the plane, boarding the plane (c), and ideally, becoming a confident flyer (d).

(see **Figure 33.1**). After several therapy sessions, thoughts and photos are replaced by experience, beginning with somewhat easy tasks like watching planes land a mile away and leading gradually to boarding an airplane. Eventually, you become a confident flyer. Conquering the fear of the actual event increases self-confidence (Foa & Kozak, 1986; Williams, 1987).

Sometimes an anxiety-arousing situation is too embarrassing, challenging, or expensive to be re-created. A breakthrough in systematic desensitization occurred with the introduction of **virtual reality exposure therapy** (Gregg & Tarrier, 2007). Virtual reality is more vivid than your imagination. You wear a headset projecting a three-dimensional virtual world into your visual field. Virtual reality exposure therapy has effectively helped people cope with fear of flying, public speaking, heights, post-traumatic stress, and animals (North et al., 1998; Powers & Emmelkamp, 2008; Rothbaum, 2006; Rothbaum et al., 1995, 1997; Vincelli & Molinari, 1998). These results are encouraging. And with today's sophisticated animation technology, it seems likely that avatars (true-to-life computer representations of people seeking help) will be increasingly common in such treatments, helping more people work through their fears (Gorini, 2007).

Systematic desensitization has been combined with modeling to help some patients overcome disruptive fears. For instance, someone with a fear of dogs could watch another person playing with and petting a dog. Gradually, the person learns to model the coach's behavior and touches and handles the dog (Bandura et al., 1969).

A 3-D Virtual World

The vivid images displayed in this virtual reality headset should help desensitize this person to his fear of heights.

JACK KEARSE/EMORY UNIVERSITY

WILLIAM BRITTEN/ISTOCKPHOTO

Whether using desensitization or modeling, behavior therapists do not spend a lot of time looking for the cause of the problem, trying to find out when you first experienced it, or considering your level of self-awareness. They believe that it is overcoming the maladaptive behavior that helps you feel better about yourself.

virtual reality exposure therapy An anxiety treatment that progressively exposes people to simulations of their greatest fears, such as airplane flying, spiders, or public speaking.

aversive conditioning A type of counterconditioning that associates an unpleasant state (such as nausea) with an unwanted behavior (such as drinking alcohol).

Aversive Conditioning

My second year in college, I suffered a days-long stomach illness. The last food I ate before becoming sick was a grilled cheese sandwich. Weeks later, the smell of a grilled cheese sandwich cooking still nauseated me. The smell of the sandwich had become an unpleasant thing to avoid because I had learned to associate it with vomiting and stomach pain. Do you have trouble eating some food because you associate it with illness?

Aversive conditioning is a type of counterconditioning that associates an unpleasant state (such as nausea) with an unwanted behavior (such as drinking alcohol). The process is the opposite of systematic desensitization, which replaces a negative (fearful) response with a positive (relaxed) response. Aversive conditioning replaces a *positive* response to a harmful experience (like drinking alcohol) with a *negative* (aversive) response. Aversive conditioning has been used to treat nail biting and the sexual deviancy of child molesters, but we use the treatment of alcohol abuse to show how this form of therapy works.

In treating a dependence on alcohol with aversive conditioning, therapists give people their drink of choice but with a little twist. Added to the drink is a tasteless, odorless drug that produces severe nausea. The goal is to link drinking with violent nausea so that the person develops an aversion to the smell and taste of the drink. The formerly positive reaction to drinking becomes negative (see **Figure 33.2**).

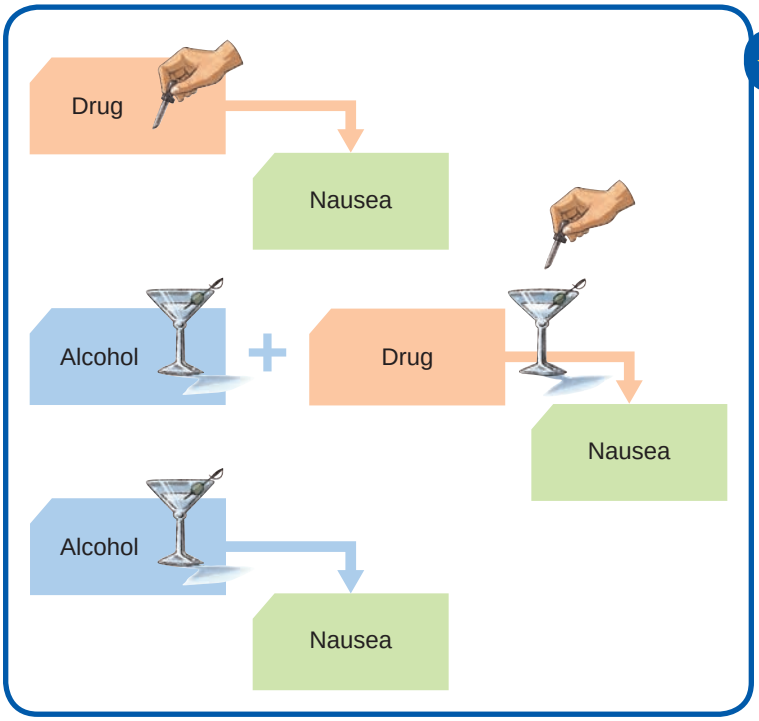


Figure 33.2
Unwanted Reactions

In an example of aversive conditioning, people with a dependence on alcohol agree to have a substance put in their drink that makes them vomit. In theory, these people associate the vomiting with drinking and become less inclined to drink substances containing alcohol.

Does this treatment for alcoholism last? In one study, 63 percent of the people treated with aversive conditioning were still abstaining from alcohol one year later (Wiens & Menustik, 1983). These people had received several booster treatments during that year. Unfortunately, however, only 33 percent of them were successfully abstaining from alcohol after three years.

Therapists recognize the limitations of aversive treatment. They often combine it with another form of treatment to produce the best results.

Operant Conditioning Techniques

Our voluntary behaviors are greatly influenced by their consequences. Therapists have applied this basic principle of *operant conditioning* to help people solve problems at home, at school, and in other settings. This simple principle—reward desired behaviors and withhold rewards or punish for unwanted behaviors—has even helped those with disorders learn to function in normal settings. People with schizophrenia, for example, have been taught to act more rationally and behave more appropriately with others. Individuals with intellectual disabilities have learned basic self-care. In both cases, therapists shaped behavior by reinforcing small steps in the right direction.

Operant conditioning techniques also give hope to parents of children with autism. These children are typically unresponsive to others, lack communication skills, and often engage in unusually repetitive behaviors. In one study (Lovaas, 1987), 19 uncommunicative, withdrawn 3-year-olds with autism took part in an intensive, two-year study. Parents worked 40 hours per week reinforcing appropriate or desired behavior while ignoring or punishing self-abusive and aggressive behaviors. By first grade, 39 of 40 children with autism *who did not* undergo treatment showed no improvement. However, 9 of the 19 receiving treatment became successfully functioning first graders with normal intelligence. Once again, therapy provides hope.

One operant conditioning technique has been used in institutions to encourage getting out of bed on time, dressing, cleaning a room, and cooperating with others. A **token economy** attempts to modify behavior by giving rewards for desired behaviors with some kind of small item. Patients (or in some cases, inmates) earn the tokens by behaving appropriately and then exchange them for simple rewards, like candy, or privileges, like watching television. Token economies have been successfully used with various populations (people with schizophrenia, delinquent teens, and other groups) and in various settings, including day-care centers, schools, hospitals, and my own home!

Critics point to two problems with behavior modification, one practical and the other ethical. First, what happens after a person is no longer reinforced for proper behavior? People who leave an institution will not receive tokens for getting out of bed on time, after all. Behavior modification therapists are aware of this problem, and they attempt to gradually shift patients from tokens and other external rewards and move them toward more internal rewards, such as satisfaction from receiving others' approval.

token economy An operant conditioning procedure that attempts to modify behavior by rewarding desired behaviors with some small item.

The second criticism asks the question of whether behavior modification is ethical. Is it right to deprive someone of a television program or dessert to obtain a desired behavior? Or is this process too controlling? Proponents insist that they are working to eliminate or modify destructive behaviors and that an improved life outweighs the temporary loss of privileges. The debate continues.

cognitive therapy Therapy that teaches people new, more adaptive ways of thinking and acting.

PAUSE NOW OR MOVE ON

Turn to page 605 to review and apply what you've learned.

Cognitive Therapies

WHAT'S THE POINT?

33-4 What is the basis of cognitive therapy and cognitive-behavioral therapy?

A revolution has taken place in psychology in the last half-century as psychologists have refocused their interest on thought processes—*cognition*—as well as behavior. This revolution is apparent in therapy, where almost half of all clinical psychologists working in university settings refer to themselves as having some sort of cognitive orientation (see **Figure 33.3**) (Mayne et al., 1994). These therapists believe our thinking affects how we feel. Cognitive explanations of illnesses like depression include the idea that self-blame ("I lost my job because I'm worthless") and overgeneralization ("I'm worthless at everything") set the stage for feeling depressed. Cognitive therapists assume that our thoughts filter the events in our lives and influence our emotional reactions to them. **Cognitive therapies** teach people new, more adaptive ways of thinking and acting.

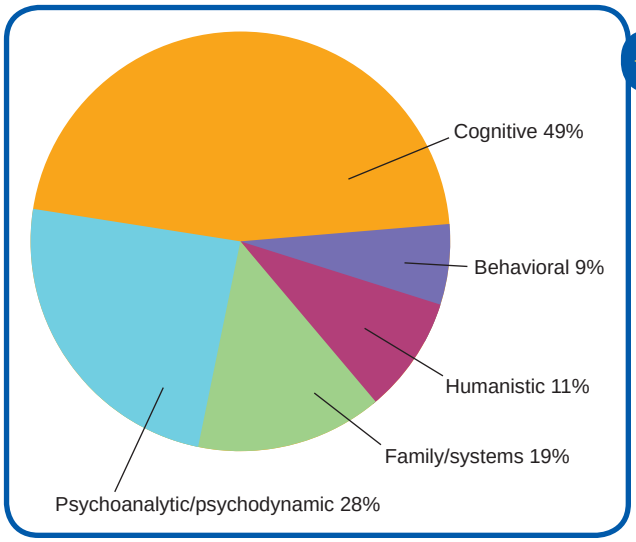


Figure 33.3
Psychologists' Orientations

Almost half of all psychologists working in university settings who conduct therapy say they have some sort of cognitive orientation. (From Mayne et al., 1994.)

Figure 33.4
Constructive Interpretations

Cognitive therapists help people explain bad events constructively instead of destructively.

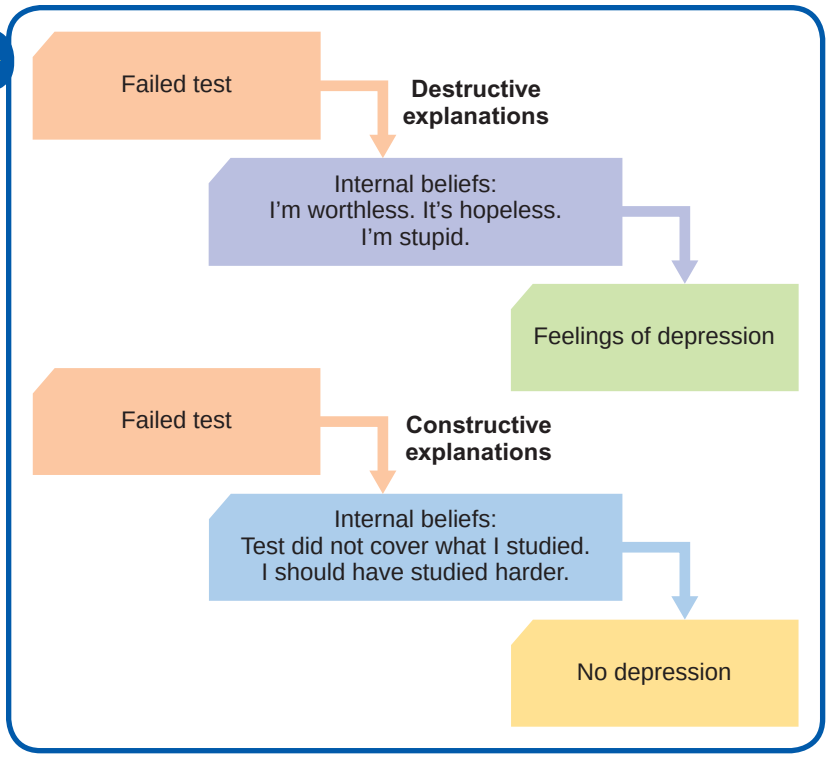
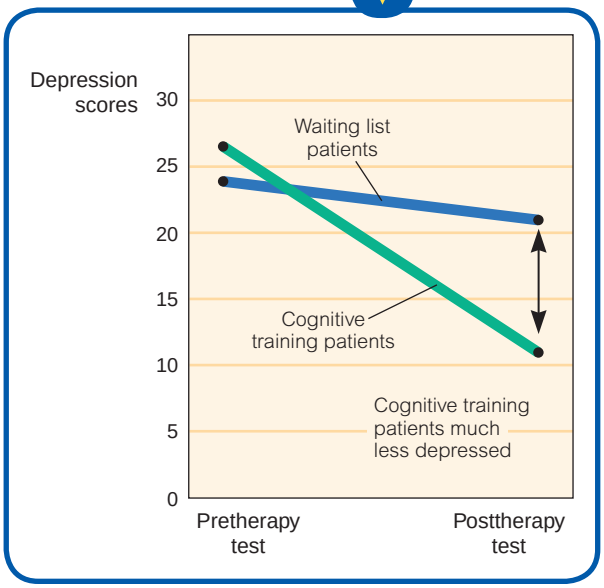


Figure 33.5
Optimistic Outlook

Participants who learn optimistic ways of explaining negative events stand a good chance of seeing depression levels decline. (From Rabin et al., 1986.)



The best psychological therapies for depression, especially major depression, appear to be cognitively based. A depressed friend might interpret your friendship as pity, your suggestions as criticism, and your questions as blame. These negative thoughts fuel depression, sustaining and worsening negative moods. In addition, whereas most of us tend to judge ourselves favorably, this *self-serving bias* is absent during depression. When something good happens, people with depression do not give themselves credit. The person might, for example, explain away an award for being helpful in class as the result of an external circumstance: "They probably drew my name out of a hat." But people with depression are good at blaming themselves squarely for any failure. What was the reason for the failing grade on the U.S. history test? "Because I'm stupid." (Not "Because I didn't study hard enough" or "Because the test covered material the teacher hadn't gone over in class.")

Cognitive therapists teach clients to think constructively instead of destructively (see **Figure 33.4**). They try to help depressed people take more responsibility for things that go well and to encourage them to give less permanent and devastating explanations for failure. One researcher and her colleagues showed depressed adults the advantages of optimistic *explanatory styles* (Rabin et al., 1986). The researchers trained these adults to reform their negative thinking patterns and asked them to record each day's good events and the role they played in each event. Depression in these newly trained positive thinkers dropped significantly, compared with levels of depression in people waiting for treatment to become available (see **Figure 33.5**). Furthermore, research shows that previously depressed college students and young children

Psychology in THE REAL WORLD

Seeking Help

Chances are that you or someone you know will need psychological services at some point. The ups and downs of a hectic world are inevitable, but the downs are sometimes a little more than we can handle alone. The following are common signs of trouble that may require professional help:

- Thoughts of suicide
- Self-destructive behavior, such as abuse of alcohol or another drug
- Disruptive fears
- Deep and lasting depression or feelings of hopelessness
- Sudden mood shifts
- Compulsive rituals, such as hand washing

Knowing you need some help to make it through a rough time in your life is a sign of strength, not weakness. If you do consider contacting a therapist, you need to know where to go. The different kinds of therapists and their training are described in **Table 33.1.** Counselors at school or school psychologists will be able to recommend names of therapists they trust. After contacting a therapist, you should describe your situation or concerns and ask the therapist to describe his or her treatment approach. It is also wise to ask about the therapist's credentials (is the therapist licensed?) and fees. If you think the therapist is a good fit for you, consider setting up an appointment.

Table 33.1

Therapists and Their Training

Type	Description
Clinical psychologist	Most are psychologists with a Ph.D. or Psy.D. and expertise in research, assessment, and therapy, supplemented by a supervised internship. About half work in agencies and institutions, half in private practice.
Clinical or psychiatric social worker	A two-year master of social work graduate program plus postgraduate supervision prepares some social workers to offer psychotherapy, mostly to people with everyday personal and family problems. About half have earned the National Association of Social Workers' designation of clinical social worker.
Counselor	Marriage and family counselors specialize in problems arising from family relations. Pastoral (religious) counselors provide counseling to countless people. Abuse counselors work with substance abusers and with spouse and child abusers and their victims.
Psychiatrist	Physicians can specialize in the treatment of psychological disorders. Not all psychiatrists have had extensive training in psychotherapy, but as M.D.s they can prescribe medications. Thus, they tend to see those with the most serious problems. Many have a private practice.

who have been trained to dispute self-defeating or negative thoughts are 50 percent less likely to develop depression in the future (Seligman, 2002; Seligman et al., 2009). Clearly, thoughts matter.

Cognitive-behavioral therapy combines cognitive therapy (changing self-defeating thoughts) with behavior therapy (changing inappropriate behaviors). With this therapy, people become aware of their irrationally negative thoughts and are taught to think more realistically and to practice behaviors

cognitive-behavioral therapy Integrative therapy that combines changing self-defeating thinking with changing inappropriate behaviors.

that are incompatible with the problem (Moses & Barlow, 2006). Let's work through an example of cognitive-behavioral therapy.

Obsessive-compulsive disorder (OCD) is characterized by unwanted repetitive thoughts (obsessions), actions (compulsions), or both. In one study, therapists had people with this disorder view a positive emission tomography (PET) scan that showed abnormal activity in their brain when a compulsive urge, like the desire to repeatedly wash hands, was present (Schwartz et al., 1996). Next, the therapists taught these people to relabel their compulsions, instead telling themselves, "I'm having a compulsive urge," and attributing the urge to their brain's abnormal activity. Finally, these people learned to engage in a pleasant alternative behavior, like gardening or taking a walk, instead of acting on the urge to wash their hands. The goal was to "unstick" the brain by focusing attention on something else and using a different part of the brain. After two or three months of weekly therapy sessions and practice at home, most participants showed normal brain activity on their PET scans and a decrease in obsessive-compulsive disorder symptoms. Several additional studies show that cognitive-behavioral therapy is especially effective in treating depression and anxiety (Covin et al., 2008; Mitte, 2005; Norton & Price, 2007). (For information about other symptoms that may signal a need for professional help, see Psychology in the Real World: Seeking Help.)

PAUSE NOW OR MOVE ON

Turn to page 605 to review and apply what you've learned.

Family and Group Therapies

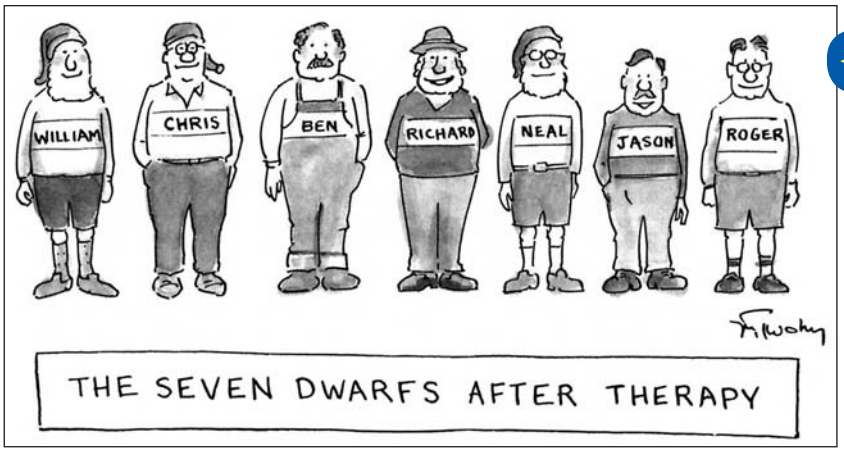
WHAT'S THE POINT?

33-5 What are the advantages of group therapy and when is group therapy most often used?

Most therapies we've examined so far can occur either individually, one on one with a therapist, or in small groups of 6 to 10 people. Cognitive, behavior, and humanistic therapists lead group therapy sessions that typically run up to 90 minutes per week. Group therapy participants discuss and react to one another's issues. Families in conflict are often recommended for group therapy.

Compared with one-on-one therapy, group therapy has some advantages (Yalom, 1985):

- Therapists can help more people in less time.
- Therapy sessions typically cost less.
- The social context of the therapy allows people to discover that others have problems similar to their own. Simply learning that others share the same troublesome feelings can bring great relief.



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Helpful Group Therapy?

Nobody really wants to be called Dopey or Grumpy, do they?

- Group meetings foster a sense of community. Bereaved, addicted, or divorced people often have a longing for the connectedness found in a group.

family therapy Therapy that views an individual's unwanted behaviors as influenced by or directed at other members of the family and attempts to guide the family toward positive relationships and improved communication.

Families sometimes need outside help when the group's need to connect emotionally conflicts with one individual's need to be more independent. **Family therapy,** which treats the family as a system, is a special kind of group therapy. A child who rebels inappropriately adds to and is affected by family tension. Family therapy views an individual's unwanted behaviors as influenced by or directed at other members of the family. Family therapists help the members of the family discover the roles they play inside their family's social unit. They try to guide the family toward positive relationships and improved communication. Opening the communication pathways within a family helps its members learn new ways of resolving and preventing conflicts (Hazelrigg et al., 1987; Shadish et al., 1993).

Perhaps it comes as no surprise that the number of support groups for those experiencing difficulty continues to rise. Alcoholics Anonymous (AA) reports having more than 2 million members in 114,000 functioning groups worldwide (2011). AA's 12-step program has helped those dependent on alcohol get sober when compared to other alcohol treatment programs (Ferri et

BRUCE AYRES/GETTY IMAGES

Family Therapy

When a family receives therapy, relationships and communication typically improve.

al., 2006; Moos & Moos, 2005). Those seeking the comfort of a support group often enjoy the emotional boost achieved by being around and interacting with others (Gallup, 1994).

PAUSE NOW OR MOVE ON

Turn to page 606 to review and apply what you've learned.

See **Table 33.2** for a comparison of the types of therapy we have discussed.

Table 33.2

Comparison of a Sample of Major Psychotherapies

Therapy	Assumed Problem	Therapy Aims	Method
Psychodynamic	Unconscious forces and childhood experiences	Reduced anxiety through self-insight	Analysis and interpretation
Humanistic	Barriers to self-understanding and self-acceptance	Personal growth through self-insight	Active listening and unconditional positive regard
Behavior	Maladaptive behaviors	Extinction and relearning	Counterconditioning, exposure, desensitization, aversive conditioning, and operant conditioning
Cognitive	Negative, self-defeating thinking	Healthier thinking and self-talk	Reveal and reverse self-blaming
Family and group	Stressful relationships	Relationship healing	Understanding family social system; exploring roles; improved communication

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 33

Thinking About Psychological Therapies

Psychoanalysis

WHAT'S THE POINT?

33-1 What is psychotherapy in general, and what is Sigmund Freud's psychoanalytic theory in particular?

- Psychotherapy is an interaction between a trained therapist and someone who is seeking to overcome psychological difficulties or achieve personal growth.
- Psychoanalysis is a theory of personality and a therapeutic technique that attributes thoughts and actions to unconscious motives and conflicts. According to psychoanalysis, psychological problems can be resolved if the analyst helps the patient bring the repressed, unconscious conflicts and impulses of childhood into the conscious mind.

- Psychoanalytic theory is criticized because of its assumption of repression, its expense to patients, and the irrefutable nature of its conclusions. Current therapists modify traditional psychoanalytic theory, using psychodynamic assumptions to understand unconscious drives and conflicts.

Apply What You Know

1. A therapist who combines cognitive and behavioral therapies is using
   a. psychodynamic therapy.
   b. a multidimensional approach.
   c. an eclectic approach.
   d. social-cultural therapy.
2. True or False: One of the most important assumptions of Freud's psychoanalytic theory is that psychological problems are caused by unconscious conflicts.

Humanistic Therapies

WHAT'S THE POINT?

33-2 How do humanistic therapists try to help people with emotional problems?

- Humanistic therapy aims to promote self-fulfillment by increasing self-acceptance and self-awareness.
- Carl Rogers developed the most famous form of humanistic therapy. His client-centered therapy uses active listening within a genuine, accepting, and empathic environment to facilitate the client's growth.
- During active listening, the therapist echoes, restates, and then clarifies the client's thoughts and feelings.

Apply What You Know

3. What would humanistic therapists say is essential for productive therapy?
4. True or False: Humanistic therapist Carl Rogers would most likely agree that most psychological problems are caused by the genes we inherit from our parents.

Behavior Therapies

WHAT'S THE POINT?

33-3 How do behavior therapists apply the principles of classical conditioning and operant conditioning?

- Behavior therapy applies classical conditioning learning principles to the elimination of unwanted behaviors through such methods as systematic desensitization and aversive conditioning.
- Therapists apply the basic principles of operant conditioning (reward desired behaviors and withhold rewards or punish for unwanted behaviors) to help people solve problems. A token economy is one such technique, which provides rewards (some kind of token) for desired behaviors.

Apply What You Know

5. Which of the following psychological problems would most likely respond well to systematic desensitization therapy?
   a. hearing voices that aren't there
   b. feeling depressed and suicidal
   c. acting violently and aggressively toward others
   d. feeling anxiety about flying on an airplane
6. A parent who gives her child a gold star every time the child reads a book is using which form of behavior therapy?
   a. token economy
   b. positive conditioning
   c. systematic desensitization
   d. unconditional positive regard

Cognitive Therapies

WHAT'S THE POINT?

33-4 What is the basis of cognitive therapy and cognitive-behavioral therapy?

- Cognitive therapy teaches people new, more adaptive ways of thinking and acting.
- Cognitive therapists teach clients to think constructively instead of destructively. Negative thoughts can fuel psychological issues, such as depression, and sustain and worsen negative

moods. Changing destructive thinking patterns into productive ones, like optimistic explanatory styles, can be beneficial to patients.

- Cognitive-behavioral therapy combines cognitive therapy (changing self-defeating thoughts) with behavior therapy (changing inappropriate behaviors).

Apply What You Know

7. The way we think about life events is central to the _____ approach to therapy.
8. True or False: Combining a cognitive approach with behavioral techniques leads to little change in self-defeating thoughts and inappropriate behaviors.

Family and Group Therapies

WHAT'S THE POINT?

33-5 What are the advantages of group therapy and when is group therapy most often used?

- Many therapies can be conducted individually or in group sessions.
- Group therapies can help more people in less time, cost less, and foster a sense of community.
- Family therapy can be of benefit because it views an individual's unwanted behaviors as influenced by or directed at other members of the family.

Apply What You Know

9. True or False: Group therapy gets to the real root of psychological problems, but individual therapy takes less time.
10. Ethan has been skipping classes, hanging out with a rough crowd, and getting into serious trouble at school when he does attend. The school guidance counselor has heard that there may be some trouble at home. She has arranged for the school psychologist to meet with Ethan, his sisters and brothers, and his parents. She has set up a _____ therapy session.

KEY TERMS AND KEY PEOPLE

psychotherapy, p. 588
eclectic approach, p. 588
psychoanalysis, p. 588
resistance, p. 589
interpretation, p. 589
transference, p. 589
client-centered therapy, p. 592
active listening, p. 592
behavior therapy, p. 594
systematic desensitization, p. 595
virtual reality exposure therapy, p. 596
aversive conditioning, p. 597
token economy, p. 598
cognitive therapy, p. 599
cognitive-behavioral therapy, p. 601
family therapy, p. 603
Sigmund Freud (1856–1939), p. 587
Carl Rogers (1902–1987), p. 592

MODULE 34

Biomedical Therapies

Drug Therapies
- Antipsychotic Drugs
- Antianxiety Drugs
- Antidepressant Drugs

Electroconvulsive Therapy

Psychosurgery

Medications are available for many psychological disorders, but in deciding to use them, one must consider the side effects as well as the potential benefits.

Two films have won multiple Academy Awards, including Best Picture, for their examination of **biomedical therapies**—the treatment of psychological disorders by changing the brain's functioning with prescribed drugs, electroconvulsive therapy, or surgery. In 1975, *One Flew Over the Cuckoo's Nest* illustrated the horror of inappropriately using shock treatments and brain surgery as a way of punishing hospitalized mental patients rather than treating them. In 2001, *A Beautiful Mind,* based on the true story of Nobel Prize–winning mathematician John Nash's descent into and apparent recovery from paranoid schizophrenia, brought the issue of involuntary drug treatment to the forefront. These films illustrate the controversies that swirl around biomedical therapies.

Biomedical approaches have received a lot of media attention, some portraying them accurately and some not. This has led to a degree of fear and uncertainty. Here we set the record straight concerning the three major biomedical approaches: drugs, electric shock, and surgery.

biomedical therapy The treatment of psychological disorders by changing the brain's functioning with prescribed drugs, electroconvulsive therapy, or surgery.

Dramatic Illustrations

One Flew Over the Cuckoo's Nest (left) and *A Beautiful Mind* (right) both provide a historical perspective on how therapists have used biomedical treatments for mental disorders. They raise controversial issues related to these treatments.

THE EVERETT COLLECTION

THE EVERETT COLLECTION

deinstitutionalization The release of patients from mental hospitals into the community.

Drug Therapies

WHAT'S THE POINT?

34-1 What do antipsychotic, antianxiety, and antidepressant drugs do, and how effective are they?

Until the 1950s, few options existed for treating serious psychological disorders such as schizophrenia. People with these disorders were usually hospitalized, but even in this environment the number of tools available for treatment was limited. Some hospitals were run well, with staff members who genuinely cared about the patients. Less-competent institutions served largely as warehouses, hiding away a segment of the population for whom little could be done. Patients often spent their days wiling away the hours in bare wards with no structured activities to occupy their time. Treatment—particularly in the 1800s and early 1900s—often subjected patients to mechanical devices that today strike us as little more than means of torture (see **Figure 34.1**). Restraints such as straitjackets, bed straps, and padded isolation rooms prevented violent patients from harming themselves or others. It was a bleak picture of long-term hospitalization in a mental health system that rarely produced improvement.

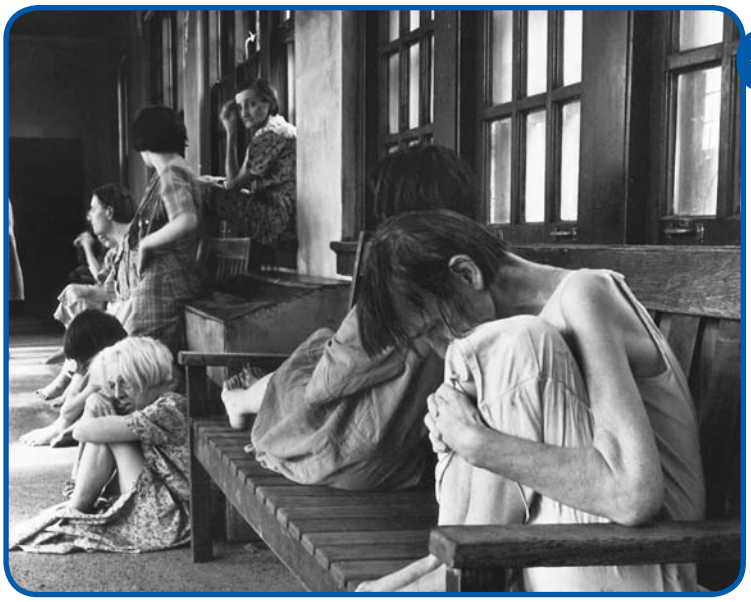
That picture changed dramatically with the development of effective drug therapies in the middle of the twentieth century. Suddenly, therapists had a way to help patients overcome the most devastating symptoms of their illness and "break through" to a more stable hold on reality. Moreover, these drugs made it possible to release patients from the large, warehouselike hospitals that everyone agreed constituted a horrible environment in which to get well. Patient populations at the hospitals dropped rapidly. Releasing hospitalized mental patients to their communities is called **deinstitutionalization,** a mouthful of a word but one that accurately describes what occurred. By the end of the century, there were only one-fifth as many hospitalized patients as there were in 1950 (see **Figure 34.2**) (Bureau of the Census, 2004).

In theory, deinstitutionalization was a wonderful advance. In practice, it did not work out quite as well as expected. If released patients lack resources and the support of family or friends, they often end up on the streets. This

Figure 34.1
Treatment or Torture?

Benjamin Rush developed this chair 200 years ago, believing that the restraint and restricted sensation it provided would help patients regain their self-control. Although this apparatus may look inhumane to us today, it was Rush who founded a movement to reform mental health care and treat mental patients with kindness.

THE BETTMAN ARCHIVE



JERRY COOKE/PHOTO RESEARCHERS, INC.

Hospital or Warehouse?

Before the advent of effective biomedical treatment, mental hospitals often did little more than house patients in bleak, crowded wards. How easy would it be to get well in an environment like this?

happened repeatedly as people were increasingly treated with drugs and released from state, county, and private mental hospitals. The country's homeless population has increased as the population of hospitalized mental patients has decreased. Research shows that about one-third of the homeless population has a serious psychological disorder (Fischer & Breakey, 1991; McCarty et al., 1991).

LEE SNIDER/THE IMAGE WORKS

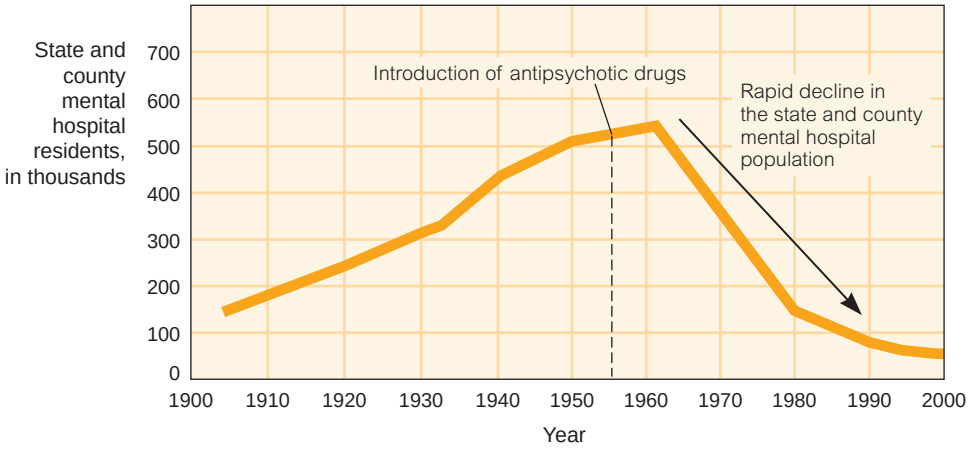
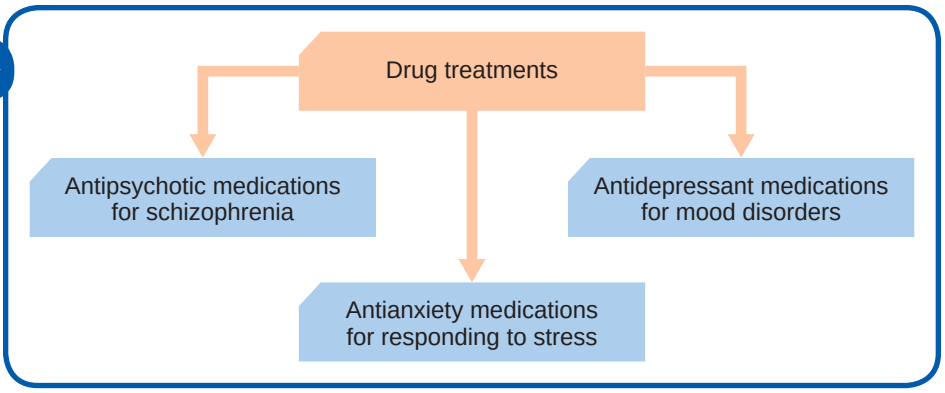


Figure 34.2
Deinstitutionalization

Once medications for serious mental disorders were introduced in the 1950s, the number of people in mental hospitals dropped dramatically. Unfortunately, however, the homeless population has increased in the United States as the number of hospitalized mental patients has decreased. (Data from the Bureau of the Census, 2004.)

Figure 34.3
Drug Treatments

Three categories of drugs used to treat mental disorders are antipsychotic medications, antianxiety medications, and antidepressant medications.


Drug treatments
Antipsychotic medications for schizophrenia
Antidepressant medications for mood disorders
Antianxiety medications for responding to stress

antipsychotic drugs A category of medications used primarily to treat schizophrenia.

The drugs that enabled deinstitutionalization fall into three broad categories (see **Figure 34.3**): antipsychotic, antianxiety, and antidepressant. Like all drugs, they produce both main effects and side effects, some of which are undesirable. Establishing the correct dosage can be tricky because not everyone responds the same way. A decision to prescribe these drugs must therefore be made carefully, with attention to the details of the individual case.

Antipsychotic Drugs

Antipsychotic drugs are used primarily to treat *schizophrenia,* a serious psychological disorder that usually involves distorted thinking and perception in the form of delusions and hallucinations. Antipsychotic medications reduce the severity and number of delusions and hallucinations (Lehman et al., 1998). They also help people with schizophrenia focus their attention on significant aspects of their environment rather than irrelevant aspects. For example, antipsychotic drugs help patients who find it impossible to stop attending to the color of a wall or the sound of a clock. This makes many patients feel more connected to the real world.

Antipsychotic drugs work by blocking the activity of the neurotransmitter dopamine, the brain chemical that, in high levels, is associated with schizophrenia. The first dopamine-lowering drug, and the one most responsible for starting the move toward deinstitutionalization, was Thorazine, which is still on the market. It has a host of negative side effects, including dry mouth, blurred vision, and constipation. Its most serious side effect is a permanent condition of muscle tremors known as *tardive dyskinesia,* which most often develops in patients who have taken large doses of the drug over a long period of time. This condition is similar to Parkinson's disease, which also is associated with low levels of dopamine (Kaplan & Saddock, 1989).

One newer drug with similar positive effects but fewer negative side effects is Clozaril (Wahlbeck et al., 1999). It is an expensive treatment, however, because those who use it must have their blood

A Better Life

Because of the antipsychotic drug clozapine, Daphne Moss no longer suffers from paranoid delusions that her parents are witches. She is now able to hold a job and live independently.

LYNN JOHNSON/STOCKPHOTO.COM

tested regularly to ensure that they aren't among the small percentage of patients who experience another serious side effect—damage to their white blood cells.

Note that no antipsychotic drug is a feel-good drug—these powerful substances do not produce the euphoric "high" that many people associate with drug use. The negative side effects are unpleasant enough that many people resist taking them, which contributes to the homelessness problem of deinstitutionalized patients. Individuals no longer under the supervision of hospital staff may not be motivated enough to continue their medication. Then the symptoms of their disease return, and they have even more difficulty succeeding in the outside world.

antianxiety drugs A category of medications used to treat people undergoing significant stress; they can be helpful in treating people with anxiety disorders.

Antianxiety Drugs

Antianxiety drugs are most often prescribed to treat people with anxiety disorders or people suffering from stress. Often, people taking antianxiety drugs have recently experienced significant stress in their lives—divorce, loss of a job, the death of a loved one, and so forth. These drugs work, in part, by boosting a neurotransmitter (GABA) that helps the brain reduce the anxiety associated with such stressful situations. This relief of tension—plus the drugs' sedative effect and ability to produce euphoria—is a powerful reinforcing influence that may keep people coming back to these drugs repeatedly until dependency develops. Antianxiety drugs themselves do not solve a person's problems. Rather, they provide temporary relief. Whatever stressors led the person to take antianxiety medications are likely to still be present when the drug wears off. For all these reasons, these drugs are best used in combination with other forms of psychotherapy to help the individual learn effective coping strategies that will eliminate the need for the drug.

Examples of antianxiety drugs are Valium, Librium, and Xanax. They should not be taken with other central nervous system depressants, such as alcohol, because the interaction of the two types of substances can produce a

AFP/GETTY IMAGES/NEWSCOM

Unavoidable Stress

Antianxiety drugs may be helpful for individuals suffering from unusual levels of unavoidable stress, like these victims of the Japanese tsunami in 2011. The drugs provide temporary relief, but they do not solve the problem that led to the stress in the first place.

antidepressant drugs A category of medications used primarily to boost serotonin levels in the brain; they can be helpful in treating major depression.

potentially lethal overdose. And since psychological and physiological dependence may develop, antidepressants, instead of antianxiety drugs, are now frequently used to treat anxiety disorders.

Antidepressant Drugs

As the name so clearly indicates, **antidepressant drugs** are useful for treating major depression. There are several groups of antidepressants, classified by the way they work, but all of them affect neurotransmitter chemicals in the brain, particularly serotonin. Low levels of serotonin are associated with depression, and these drugs boost the mood-lifting effect of serotonin in the brain.

This category includes Prozac, Zoloft, and Paxil, all of which are classified as *selective serotonin reuptake inhibitors (SSRIs)*. This scary-sounding phrase simply describes what the drugs do, which is block the *reuptake,* or reabsorption, of serotonin after it has been released into the synapse—the gap separating two nerve cells (neurons) (see **Figure 34.4**). This blocking action causes the serotonin to remain active in the synapse longer than it otherwise would. The use of antidepressants has skyrocketed in recent years, and they are taken by millions of people around the world. One out of 20 men and more than one out of 10 women in the United States are on a prescription for antidepressants (Barber, 2008). Some veterinarians even prescribe Prozac for dogs to cure them of emotional problems perceived by their owners! Given their widespread use and the potential for negative side effects, it's important to remember that there are other effective ways to treat depression. Cognitive therapy, for example (described in Module 33), can be used instead of or in addition to drug therapy.

For reasons not yet fully understood, antidepressant medications must be taken for about a month before becoming fully effective. This *therapeutic lag* can be frustrating for the patient, especially if the first prescribed dose is too low to be effective or if the first prescribed drug produces undesirable side effects. In such cases, several more weeks must elapse before the

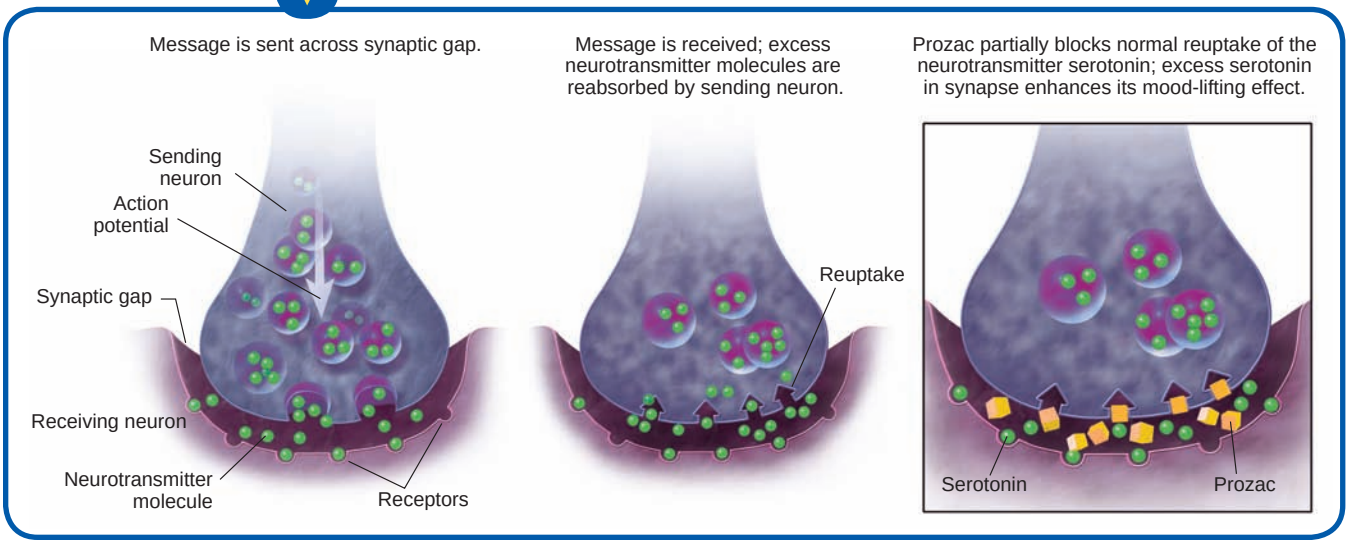

Message is sent across synaptic gap.
Message is received; excess neurotransmitter molecules are reabsorbed by sending neuron.
Prozac partially blocks normal reuptake of the neurotransmitter serotonin; excess serotonin in synapse enhances its mood-lifting effect.
Sending neuron
Action potential
Synaptic gap
Receiving neuron
Neurotransmitter molecule
Receptors
Reuptake
Serotonin
Prozac

Figure 34.4
Prozac and the Brain

Prozac acts to keep the neurotransmitter serotonin active longer than it otherwise would be. Higher levels of serotonin are associated with lower levels of depression.

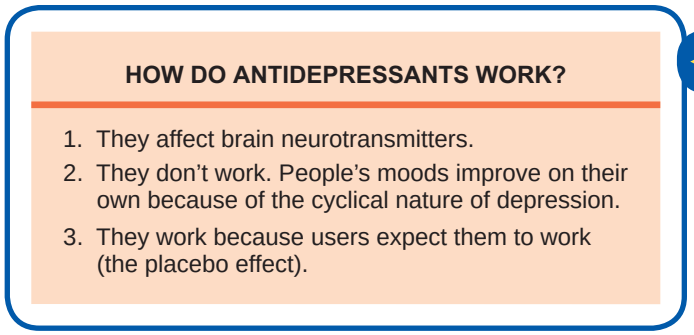

HOW DO ANTIDEPRESSANTS WORK?
1. They affect brain neurotransmitters.
2. They don't work. People's moods improve on their own because of the cyclical nature of depression.
3. They work because users expect them to work (the placebo effect).

Figure 34.5
A Mystery

Researchers have yet to nail down exactly how antidepressants work. Their effect may be a combination of the factors listed here or of other factors not yet identified.

effectiveness of a different dose or a new drug can be determined. During this time, other factors can increase or decrease the patient's depression, clouding the effects of the drug. Once the proper dose of the proper drug has been determined, however, a person can usually stay on it for long periods with no further adjustment.

Judging the overall effectiveness of antidepressants is particularly difficult because depression is a *cyclical* disorder (see **Figure 34.5**). This means that depression goes through cycles—just as normal moods do—lifting and deepening over time. Can you see how this cyclical path makes it difficult to judge whether a medication is working? Say that a person with depression begins taking a drug like Prozac. Before any judgment can be made, the one-month therapeutic lag must pass. What if the depression lifts after that month? Can you reliably say that the drug worked? Not really, because you still don't know whether the improvement was a result of the drug or of the cyclical nature of the disorder.

Other research confuses matters even further. One study (Kirsch & Sapirstein, 1998) combined the effects of almost two dozen carefully conducted studies. These studies compared the drug treatment results of one group given an antidepressant and another group given a *placebo*—a pill that has no chemical effect. People given the placebo reported almost as much improvement as people given the antidepressant medication. In other words, people's belief that they would feel better after being given a pill had almost as much effect on mood as did the real serotonin-enhancing drug.

Additional research will help determine whether the improvement prompted by antidepressants is more the result of the chemical effects of these drugs or the result of the expectations they produce. Such drugs sometimes have remarkably positive effects on people who might otherwise be seriously impaired, but they are not a miracle cure that instantly rids sufferers of their depression. Some negative media reports about the effects of the drugs—for example, that they produce suicidal behavior in a percentage of users—also require careful evaluation and have led to warning labels about the potential dangers of these drugs when used with adolescents. Remember, however, that users of antidepressant drugs are taking these substances precisely because they are searching for relief from depression. It should come as no surprise that a percentage of these users are suicidal—not because of the drug but because of the severity of their disorder. This idea is supported by studies involving hundreds of thousands of depressed people who were

shown to be *less* likely to commit suicide if antidepressants were prescribed (Gibbons et al., 2007; Simon & Savarino, 2007; Søndergård et al., 2006).

One other drug deserves mention before we leave the antidepressants behind. It has been known since the 1940s that bipolar disorder, which produces wild mood swings from depression to mania (marked by excessive optimism and energy), responds well to compounds of *lithium*. Despite science's lack of understanding of exactly how lithium works, 70 percent of people with bipolar disorder show improvement when they take this drug (Solomon et al., 1995).

Drug therapies are changing rapidly, as new drugs are developed and older drugs are tested for multiple purposes. Our understanding of neurochemistry is growing daily, and as knowledge continues to accumulate, drug treatments should become more effective and the number of negative side effects should diminish.

PAUSE NOW OR MOVE ON

Turn to page 618 to review and apply what you've learned.

Electroconvulsive Therapy

WHAT'S THE POINT?

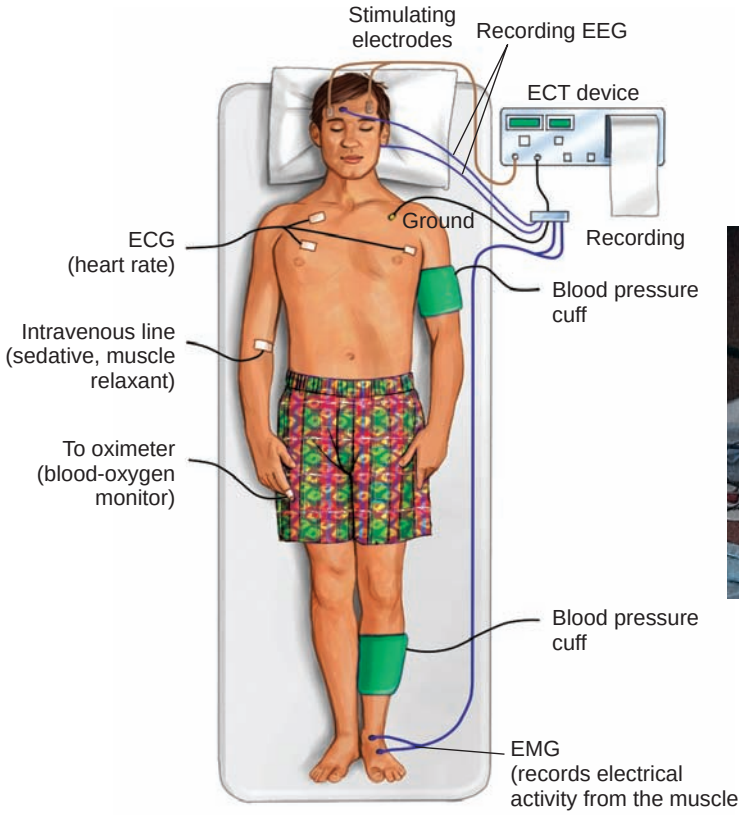
34-2 What is "shock therapy," and is it effective?

"Shock treatments." The very phrase is frightening, raising images of electrocution, pain, jerky convulsions, and Frankenstein-like laboratory experiments. Why would a doctor administer **electroconvulsive therapy (ECT),** a brief electric current that is sent through the brain of an anesthetized patient until a convulsion is produced?

This form of therapy began in Europe in the first half of the twentieth century. A depressed patient who also had diabetes experienced a convulsion after being given the wrong dose of insulin. Remarkably, when he recovered from the convulsion, his depression had lifted. This led to experiments in which nondiabetic depressed patients were given enough of a drug to stimulate a convulsion. The results were encouraging, but the drugs were difficult to manage. Too small a dose would fail to produce a convulsion, and too large a dose would lead to death by overdose. By the late 1930s, researchers found they could trigger convulsions far more reliably and safely with electricity than with chemicals. To do this, they placed electrodes on the patient's right and left temples and passed a current directly through the brain.

electroconvulsive therapy (ECT) Therapy for major depression in which a brief electric current is sent through the brain of an anesthetized patient.

Although effective in treating depression, ECT was frightening to observe in its early days. Patients felt no pain when the shock was administered, because they instantly lost consciousness. However, the resulting convulsion caused every muscle in the body to contract, sometimes with enough force to break bones. At a minimum, patients would be sore following the procedure.



WILL MCINTYRE/PHOTO RESEARCHERS, INC.

Figure 34.6
Electroconvulsive Therapy

ECT is an effective treatment for depression. Patients receiving this treatment are carefully monitored throughout the procedure. Physicians administer drugs and use a rubber bite block to eliminate injuries caused by convulsions and to relax the patient.

The modern version of ECT is far more humane (see **Figure 34.6**). Medical personnel administer muscle relaxants in advance to greatly dampen the convulsion—often the only visible indication of convulsion is a minor twitch of the extremities. A sedative puts the patient to sleep, avoiding the rapid loss of consciousness that many found unpleasant.

ECT is almost always used to treat major depression, often when antidepressant drugs have failed. When a series of shocks is given (usually three a week for two to four weeks), 80 percent of people—even those who had not responded favorably to antidepressant drugs—show improvement (Pagnin et al., 2004). ECT works more quickly than drugs and is effective even with deep depression, so it is sometimes used to treat suicidal patients.

ECT's most serious side effect is disruption of memory, especially for the approximate time the treatment was administered, but researchers have been unable to identify any brain damage resulting from the procedure. The newest version of the procedure uses briefer electrical pulses and often administers them only to one side of the brain. This seems to cause less memory loss (HMHL, 2007).

If you're wondering just how administering electric shocks to the brain could alleviate depression, you are not alone. One theory says that the procedure stimulates the brain to release neurotransmitters that elevate mood, but we have no data to support this or any alternative explanation (Kapur & Mann, 1993). Our lack of understanding about how ECT works, combined with its potential for serious side effects such as memory loss, fuel continuing

controversy about this treatment. To those who have been helped, however, the reason it works is less important than the fact that it does.

Research is under way to discover related, less traumatic procedures. One promising technique, *repetitive transcranial magnetic stimulation (rTMS),* uses magnetic fields instead of electricity and usually does not produce convulsions. In recent studies, people who received a series of rTMS treatments showed significantly more improvement than a control group did (George & Belmaker, 2007; Gross et al., 2007; Klein et al., 1999; O'Reardon et al., 2007). Another new technique targets the emotion center in the brain by using an implant to stimulate the vagus nerve in the chest (Fitzgerald & Daskalakis, 2008; Marangell et al., 2007).

PAUSE NOW OR MOVE ON

Turn to page 618 to review and apply what you've learned.

Psychosurgery

WHAT'S THE POINT?

34-3 Why were lobotomies performed, and why are they no longer used?

If the specter of therapy by shocking the brain is frightening, the thought of curing by cutting is downright petrifying. The most famous example of psychosurgery is a now-rare procedure called a **lobotomy** that was once used to calm uncontrollably emotional or violent patients. The procedure cut the nerves that connect the frontal lobes of the brain to the deeper emotional centers.

The lobotomy has a fascinating history, and it touched the lives of tens of thousands of patients in the United States until drug treatments replaced it in the 1950s (Valenstein, 1986). When Egas Moniz first introduced this surgery in Portugal, it was greeted with such enthusiasm that he received a Nobel Prize for his work. Moniz theorized that serious disorders such as schizophrenia occurred because the brain's deep emotional centers overwhelmed the person's ability to use the rational functions of the frontal lobe. The "solution" was to disconnect the frontal lobe from the emotional centers. How? By inserting an ice pick–like tool next to the eye of an unconscious patient, driving it through the thin bone of the eye socket, and swinging the pick to cut the connections at the base of the frontal lobe. This procedure could be done in minutes without even opening the skull. Two American physicians, Walter Freeman and James Watts, brought the procedure to the United States and toured from hospital to hospital performing literally thousands of lobotomies.

lobotomy A now-rare form of psychosurgery once used to try to calm uncontrollably emotional or violent patients; the procedure cut the nerves that connect the frontal lobes of the brain to the deeper emotional centers.

Moniz and his followers intended lobotomies to be used only on uncontrollable and violent patients with schizophrenia. Remember that the

BETTMANN/CORBIS

Lobotomy

In this 1949 photograph, Walter Freeman demonstrates the procedure for a lobotomy. Freeman and his colleague James Watts performed thousands of such operations in the 1940s.

procedure was developed before the antipsychotic drugs, when few treatments were available. There were isolated cases when it worked well, but the initial rush of confidence in the procedure meant that most cases were not thoroughly evaluated for appropriateness and few were adequately followed up after the surgery. It would be an overstatement to say that lobotomized patients were "vegetables," but too often the procedure reduced them to an unmotivated and immature state in which they vacantly stared into space for long periods of time.

Public reaction to lobotomies was so negative that researchers have been reluctant to explore other, less drastic surgical procedures. In a relatively small number of cases, precisely guided surgical lesions are used to destroy small areas of brain tissue in an effort to control seizures or disrupt severe obsessive-compulsive patterns that have not responded to other kinds of treatment (Sachdev & Sachdev, 1997). Given the permanent nature of surgery and the sorry history of lobotomies in the United States and around the world, these new procedures are used only as a last resort.

PAUSE NOW OR MOVE ON

Turn to page 618 to review and apply what you've learned.

A variety of therapies is available for treating psychological disorders. In this module, we have focused on biologically based medical approaches. Researchers have made tremendous strides in learning what treatments are effective, and they now guide patients toward the right treatment—or combination of treatments—to reduce their suffering. As former American Psychological Association president Martin Seligman says, "At least 14 disorders, previously intractable, have yielded their secrets to science and can now be either cured or considerably relieved" (Seligman & Csikszentmihalyi, 2000, p. 2). We can surely say that the future is indeed much brighter than the past for the treatment of mental disorders.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 34

Thinking About Biomedical Therapies

Drug Therapies

WHAT'S THE POINT?

34-1 What do antipsychotic, antianxiety, and antidepressant drugs do, and how effective are they?

- Antipsychotic drugs work by blocking the activity of the neurotransmitter dopamine and are used primarily to treat schizophrenia.
- Antianxiety drugs boost the neurotransmitter GABA and are most often prescribed to treat people with anxiety disorders or people suffering from stress.
- Antidepressant drugs affect the neurotransmitter serotonin and are useful for treating major depression.
- The development of these drugs enabled many people with serious mental illnesses to be deinstitutionalized and improved the quality of life for millions of people.

Apply What You Know

1. Because the stressors that contribute to anxiety disorders will still be present after one takes antianxiety drugs, patients may be encouraged to
   a. never take antianxiety drugs.
   b. combine antianxiety drugs with psychotherapy or counseling.
   c. combine antianxiety drugs with electroconvulsive therapy.
   d. take a combination of antianxiety and antipsychotic drugs.
2. True or False: It may take several weeks before the effects of antidepressant drugs are felt.

Electroconvulsive Therapy

WHAT'S THE POINT?

34-2 What is "shock therapy," and is it effective?

- Electroconvulsive therapy (ECT) consists of a brief electric current sent through the brain of an anesthetized patient until a convulsion is produced.
- ECT is often an immediately effective treatment for major depression. It may be used when antidepressant drugs have failed.

Apply What You Know

3. True or False: Electroconvulsive therapy is less effective than antidepressant drugs in the treatment of depression.
4. True or False: Electroconvulsive therapy has largely been replaced by repetitive transcranial magnetic stimulation.

Psychosurgery

WHAT'S THE POINT?

34-3 Why were lobotomies performed, and why are they no longer used?

- A lobotomy is a surgical procedure in which the nerves that connect the frontal lobes of the brain to the deeper emotional centers are cut.
- This surgery was developed when few treatments were available and often calmed uncontrollably emotional or violent patients. However, it was overused, often reduced people to an unmotivated and immature state, and fell out of favor with the development of antipsychotic drugs.

Apply What You Know

5. Lobotomies were originally intended as a treatment for
   a. schizophrenia.
   b. depression.
   c. anxiety disorders.
   d. bipolar disorder.

6. True or False: To perform a lobotomy, the surgeon would enter the brain through the eye socket.

KEY TERMS

biomedical therapy, p. 607
deinstitutionalization, p. 608
antipsychotic drugs, p. 610
antianxiety drugs, p. 611
antidepressant drugs, p. 612
electroconvulsive therapy (ECT), p. 614
lobotomy, p. 616

Stress and Health

MODULES

35 Effects of Stress

36 Promoting Wellness

One day after school, one of my students came in to ask for an extension on a research project. He explained that play rehearsals had been running late, he had several tests scheduled at the end of the week, and he had let the research paper slide. He also said he was "feeling really stressed out."

Have you ever used that phrase? We all experience stress, no matter what we call those feelings. And we all know that stress can turn a good day into a bad day. But what will happen if the feelings continue over a long period? Will our health be affected? Are there ways to minimize the "stressed out" feeling when it hits? And how do our emotions affect this feeling?

Health psychologists search for answers to these and other health-related questions, and we review much of their work here. In Module 35, we show how psychologists link the effects of stress to illness. And in Module 36, we explore whether certain behaviors and thoughts can improve your health and wellness and can help prevent illness.

MODULE 35

Effects of Stress

Stress
- Responding to Stress
- Stressful Events

Effects of Perceived Control

Stress and Disease
- Cancer and Stress
- Stress and Heart Disease

Sometimes stress gets the better of us. How does stress affect you? Let's find out.

"Worry affects the circulation, the heart, the glands, the whole nervous system."

—Dr. Charles Mayo (1865–1939)

Although the situation was not funny, I must admit I chuckled. For the second consecutive year, Debbie (a former student of mine) had been cast as a female lead in the school musical. And for the second straight year, Debbie lost her voice the Monday before the show opened. Students in the cast and teachers in the hallways wondered, "How could this happen two years in a row?" Was Debbie's condition "all in her head"—that is, with no physiological cause? Was she bluffing in some odd attempt for sympathy? Was she simply "stressed out" and in need of rest? According to the show's director, no other lead in the previous 10 years had experienced this problem.

Well, the show went on, and Debbie sang "Oklahoma" and all her other songs beautifully all three nights, just as she had the year before. Debbie's reaction to her upcoming onstage performance differed from that of several other actors who were nervously anticipating the show. She never developed any cold symptoms, for example, but she did lose and regain her voice. Why did this happen?

This puzzle is just one example of the effects of stress on health, the topic of this module. The relationship between stress and health, like so many others that psychologists study, involves both the mind and the body. We begin with a close look at how psychologists define *stress.*

Stress

WHAT'S THE POINT?

35-1 What is stress, and how do our bodies react to it?

SVETLANA BRAUN/ISTOCKPHOTO

A Stress Reaction?

Blemishes that appear at inopportune times are often reactions to stress.

Suppose it's Friday morning, and tonight—after months of wanting to go out with someone—you finally will have that big date, a date that has made it hard to concentrate at times during the week. You've decided what you're going to wear, and you and your date have decided where you're going to eat and what movie you'll see. Brushing your teeth, you look in the mirror and discover the start of a rather large pimple on the right side of your nose. A perfect situation just became less perfect. Welcome to **stress**—the process by which we perceive and respond to events, called *stressors,* that we appraise as threatening or challenging.

Where is the stress in this situation? Is it the date, the pimple, or both? Most psychologists would say that neither the date nor the pimple is stress. Rather, the date is a *stressor,* an event you could appraise as threatening or challenging. The pimple is a *stress reaction,* although it may become a stressor as well. Remember, stress is a process of perceiving and responding. Our appraisal of an event as potentially threatening or challenging can make a huge difference in what we experience and in how effectively we respond.

The subfield of **health psychology** focuses on how stress affects our well-being and our health. Health psychologists ask questions such as the following:

- How are stress and illness related?
- How do our perceptions of stress affect our health?
- Can we control our reactions to stress?
- What behaviors and attitudes help prevent health problems?

Given that three out of four people say they often experience stress daily (Carroll, 2008), understanding our responses to stress and their effects on our health is of great importance.

stress The process by which we perceive and respond to certain events, called stressors, that we appraise as threatening or challenging.

health psychology A subfield of psychology that focuses on how stress affects well-being and health.

Responding to Stress

Stress is inevitable, but unhealthy responses to it are not. When faced with a stressor, such as a dead cell phone when you need to call your friend, how do you respond? Is the dead cell phone a threat? ("My friend will think I

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Everyday Hassles

Depending on your response to stressors, your health may suffer from the combined effects of daily hassles.

WALTER CANNON (1871–1945) American physiologist who, with Philip Bard, concluded that physiological arousal and emotional experience occur simultaneously (see *Cannon-Bard theory*).

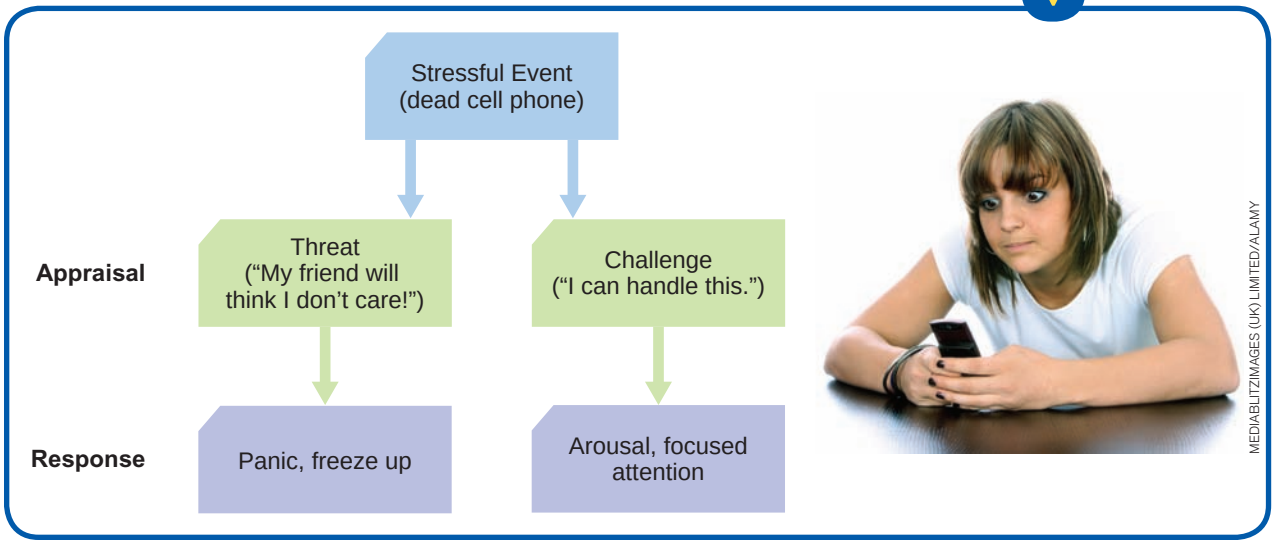
FOTOSEARCH/GETTY IMAGES

don't care! He'll hate me.") Or is it a challenge? ("I can handle this. Let's see, what are my options?") Your appraisal of the situation is crucial. If you see the stressor as a threat, you'll be more likely to panic and freeze up, making it more difficult to solve your problem. If, instead, you view the stressor as a challenge, your response will be focused, and you'll be more likely to overcome the obstacle (see **Figure 35.1**). Your perception of the stressor directly affects your emotional responses. The top athletes, the best teachers, and the most effective leaders seem to thrive when faced with what they perceive as a challenge.

Our emotional responses to stressors vary, but our physical responses share some important similarities. Imagine the following scenario. You were supposed to finish reading *Julius Caesar* for English class yesterday, but you forgot your book at school. This morning, your teacher started class by saying, "For today's short-answer quiz, please take out a blank sheet of paper." Surprised by the announcement and unprepared to succeed, you experienced a unified, mind-body stress response. Physiologist **Walter Cannon** (1929) found that a number of situations—from emotion-arousing incidents like a pop quiz to physically stressful conditions like extreme cold—trigger the release of stress hormones into the nervous system. Your

Figure 35.1
Assessing Stress

Your appraisal of a stressful event greatly influences how you will respond to it emotionally and physically.



MEDIABLITZIMAGES (UK) LIMITED/ALAMY

general adaptation syndrome (GAS) Selye's concept of the body's adaptive response to stress in three phases—alarm, resistance, and exhaustion.

JOHN OLSON/TIME LIFE PICTURES/GETTY IMAGES

HANS SELYE [SELL-yay] (1907–1982) Canadian physiologist who researched a recurring response to stress that he called the general adaptation syndrome (GAS).

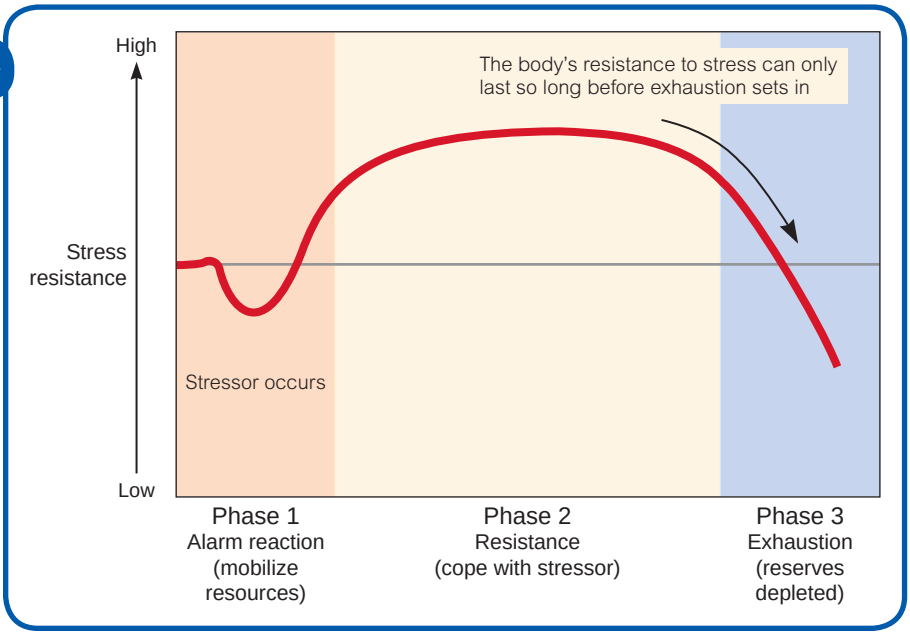
nervous system, as part of its stress response, increases your heart rate, dulls your sensation of pain, and sends more blood to your larger muscles, preparing you either to take action against the challenge (fight) or to flee from it (flight). Cannon's work on the fight-or-flight response paved the way for another scientist, whose highly respected research greatly expanded our understanding of stress.

Hans Selye (pronounced SELL-yay) discovered a predictable, recurring response to all stressors that can be likened to a motion detector that turns on a light regardless of the motion detected. This response to stressors is so general in nature that Selye (1936, 1976) called it the **general adaptation syndrome (GAS).**

According to Selye, the general adaptation syndrome has three phases (see **Figure 35.2**). Phase 1 is an *alarm reaction,* which happens when your nervous system is activated following an emotional or physical trauma (as explained in Cannon's fight-or-flight research). With your heart pumping faster and all other resources at the ready, your body mobilizes itself to meet the challenges of Phase 2, *resistance.* The outpourings of stress-related hormones keep your respiration, temperature, and blood pressure high. But your body is not built to sustain this kind of resistance indefinitely. With extended exposure to the traumatic event, your body's reserves become depleted, and Phase 3, *exhaustion,* becomes likely. Exhaustion brings greater susceptibility to illness and, under extreme circumstances, death. Selye's bottom line: Although our bodies are built to handle temporary stress, prolonged stress will produce physical deterioration. Evidence supporting Selye's bottom line includes brain scans of those who have lived through extended combat conditions or child abuse. The flood of stress hormones accompanying these traumatic events appears to correspond with the shrinking of a brain structure called the *hippocampus.* This brain structure is vital for memory recall, and those experiencing the trauma may experience memory difficulties (Sapolsky, 1999, 2003).

Figure 35.2
Selye's General Adaptation Syndrome (GAS)

Following a traumatic event, the body enters an initial alarm phase. Over time, the body's resistance to stress decreases.



This isn't to say that stress always has a negative physical effect. For example, sudden, temporary stress can kick your immune system into gear, helping you heal faster and fight off infection (Segerstrom, 2007).

Stressful Events

Researchers investigating the relationship between stress and health have been interested in three types of stressors: daily stress, significant life changes, and catastrophes.

SERGEI GRITS/AP/WIDE WORLD PHOTOS

Reaction to War

With prolonged exposure to warlike conditions, this family's resistance to the stressors of famine and war may lead to exhaustion and increase the likelihood of illness.

Daily Stress Your locker jams. Your lab partner fails to complete his part of the lab. The lunch line is so long you'll probably have all of five minutes to eat by the time you collect your food. According to several researchers (Kohn & Macdonald, 1992; Lazarus, 1990; Ruffin, 1993), the most significant sources of stress may be the everyday hassles we regularly face. Ever lose your keys when you were already late? Misplace your ticket to a concert? Wear the same shirt to school as someone you don't like? Combine these hassles over time, and depending on your response to these stressors, your health may suffer. The inability to let go of goals you can't meet—getting a dance solo in the recital or a date with someone who won't give you the time of day—is also an everyday stressor that can wear you down (Miller & Wrosch, 2007).

The effects of stress on health come as no surprise to those living in urban ghettos, where some of the highest rates of blood pressure occur. The overcrowding, unemployment, and poverty found in these areas add up to high levels of daily stress. Add the incidents of racism that members of minority groups often experience while living in these conditions—such as knowing that others doubt your intelligence and integrity simply because of what you look like—and the daily pressures are compounded like interest on a bank loan. Researchers have tied abnormally high blood pressure rates in some African-Americans to life's daily stressors, especially when perception of racism and poor living conditions coincide (Clark et al., 1999; Mays et al., 2007).

Overwhelmed Parents

In fact, it's not a laughing matter: the demands of making ends meet while raising a family can lead to burnout in parents.

Political upheaval also brings high levels of daily stress. What happened to life expectancy among Russian men following the collapse of communism in the 1990s? It fell by five years, and suicide, divorce, and murder rates all rose (Holden et al., 1998).

The persistent daily hassles that are part of daily work life can produce the state of physical, emotional, and mental exhaustion called *burnout* (Maslach, 1982). When you hear people say they're "burned out" on something, it typically means

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"Your mother and I are feeling overwhelmed, so you'll have to bring yourselves up."

they've had enough. Police officers worn down by high-stress situations, parents worn down by persistent parenting hassles, and teachers worn down by the during- and after-school demands of teaching are all candidates for burnout. The results of burnout include the following:

- Depression (from the emotional exhaustion)
- Decreased performance or productivity (from the physical exhaustion)
- Cynicism (from the mental exhaustion)

Significant Changes Significant personal changes in your life are the second kind of life event stressor. The death of a loved one, leaving home to live on your own, and divorce are examples of stressors related to life transitions.

There are at least two ways to study the health effects of significant life changes. The first is to compare the lives of those who suffer the same illness, such as a stroke, to determine whether they shared similar life changes that would predict the illness. The second and more time-consuming method involves tracking people over time, noting whether a life change precedes an illness. Two such long-term studies found a greater vulnerability to disease in people who had recently been fired, widowed, or divorced (Dohrenwend et al., 1982; Strully, 2009). Another study found that the likelihood of death in widowed people doubles in the week after their partner's death (Kaprio et al., 1987).

Catastrophes Hurricanes, terror attacks, and earthquakes are all large-scale, relatively unpredictable, life-threatening events. Do these catastrophic stressors affect health? If the September 11, 2001, terrorist attacks, 2005's Hurricane Katrina, and the Los Angeles earthquake of 1994 are any indication, the answer is *Yes*. Around 65 percent of all Americans surveyed indicated difficulty sleeping in the weeks after the 9/11 attacks (Wahlberg, 2001). According to the Centers for Disease Control and Prevention (CDC), 44 percent of the Katrina-related deaths in Alabama were related

Catastrophes

Catastrophes, such as 2011's Cyclone Yasi in Australia, shown here, are deadly with both the flooding and stress they bring.

AFP/GETTY IMAGES

to stress (CDC, 2006). Four months after that hurricane, the suicide rate in New Orleans had tripled (Saulny, 2006). And on the day of the Los Angeles earthquake, five times the normal number of sudden-death heart attacks were reported, but only 13 percent of these deaths were deemed a result of running, lifting debris, or some other form of physical exertion. What accounted for the remainder of the increase? The likely answer is stress (Muller & Verrier, 1996).

Catastrophes often mean prolonged exposure to stress. A comprehensive review of studies addressing the psychological effects of disasters showed a 17 percent increase in the likelihood of depression and other disorders (Rubonis & Bickman, 1991). The stress of catastrophes puts us at psychological and physical risk.

PAUSE NOW OR MOVE ON

Turn to page 632 to review and apply what you've learned.

Effects of Perceived Control

WHAT'S THE POINT?

35-2 What are the effects of perceived control, optimism, and pessimism on stress reactions?

The negative effect of every stressor in our lives—running out of gas, failing an exam, feeling obligated to buy a holiday gift for someone who unexpectedly gave you one at the last minute—is magnified if we think of the stressor negatively and as something beyond our control. Let's look at how a sense of control and optimism are linked to stress effects.

Several lines of research demonstrate the importance of perceived control on health. One study showed that uncontrollable stress (along with a bacterial infection) produces the harshest stomach ulcers in humans (Overmier & Murison, 1997). Another study by Judith Rodin (1986) compared nursing home patients who perceived little control over their activities with similar patients who were able to control some of their daily routines. Rodin found that patients perceiving less control declined in health more rapidly and died sooner than those with more control. Other research found lowered immunity to disease among rats exposed to uncontrolled stress (Weiss, 1977). When two rats simultaneously received the same amount of mild electrical shock, the rat that could turn off the shock stayed just as healthy as a rat receiving no shock. These "empowered" rats were healthier than shocked rats that had no control over the shocking mechanism.

Optimism also seems to offer some protection against the effects of stress. How would you respond to the statement "In uncertain times, I usually expect the best"? If you agree, you may have an optimistic approach

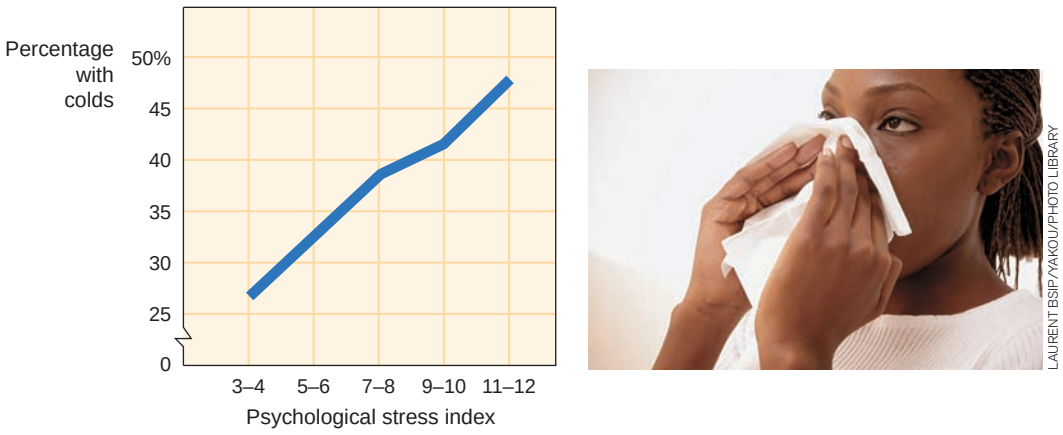


Figure 35.3
Stress and Illness

When given a cold virus, people who went on to develop a cold had the highest life stress scores. (From Cohen et al., 1991.)

to life. Compared with their pessimistic counterparts (those with a negative approach to life), students identified as optimists have stronger immune systems and are less likely to become ill or fatigued during the last month of the semester. Optimists also recover more quickly from heart surgery than pessimists, miss fewer days of work due to illness, and when stressed, register lower blood pressure readings (Segerstrom et al., 1998; Seligman, 1991). One study of 2400 Finnish men revealed that those with a hopeless, bleak outlook on life were twice as likely to die during a 10-year span than were those labeled optimists (Everson et al., 1996).

So, why are optimism and a perceived sense of control good predictors of better health? And why do pessimism and perceived loss of control predict poor health? The answer, once again, involves the interplay between mind (your perceptions or appraisals) and body (your physiology).

Both pessimism and perceived loss of control lead to the production and release of *stress hormones*. Ridding yourself of these hormones uses up your body's reserves of disease-fighting white blood cells. This weakens and thereby hinders your immune system's ability to ward off diseases it would otherwise defeat. Surgical wounds in both humans and animals, for example, heal more slowly under stressful conditions. In one ingenious study showing this effect, researchers made a small, precise puncture wound in the skin of volunteer dental students. Puncture wounds made during summer vacation healed significantly faster than wounds made three days before major exams (Kiecolt-Glaser et al., 1998). Another study by Sheldon Cohen and his colleagues (1991) revealed that when given a cold virus, research participants who reported high life stress scores were more likely to go on to develop a cold (see **Figure 35.3**). Later research showed that the cold virus was similarly best resisted by the happiest and most relaxed participants (Cohen et al., 2003, 2006). Stressed-out individuals have weaker disease-fighting mechanisms than those who are relatively free of stress. So, if you catch a cold, you'd better chill.

PAUSE NOW OR MOVE ON

Turn to page 632 to review and apply what you've learned.

Stress and Disease

WHAT'S THE POINT?

35-3 What are the effects of stress on cancer and heart disease?

It's well documented that stress makes minor illnesses, such as colds, more likely. Stress also plays a role in significant diseases.

Cancer and Stress

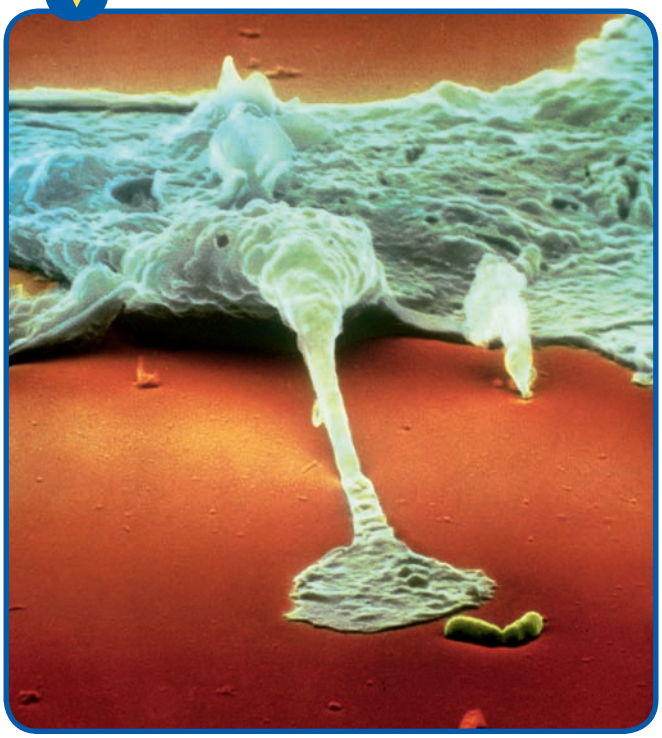
Because of conflicting research, the relationship between stress and cancer is not entirely clear. Some researchers have looked for—but not found—a connection between stress and cancer (Edelman & Kidman, 1997; Fox, 1998). For example, World War II concentration camp survivors underwent prolonged, horrific stress, but they have not shown higher-than-normal cancer rates.

Other researchers have found evidence of a stress-cancer connection. In one study, people with a history of workplace stress were five times more likely to develop colon cancer than were those without workplace stress (Courtney et al., 1993). Cancer patients who verbalize their feelings (presumably releasing stress) have a slightly higher survival rate than cancer patients who keep a cork in emotion's bottle (McKenna et al., 1999; O'Leary, 1990; Temoshok, 1992).

Two things are clear: (1) Stress does not appear to *create* cancer cells, but (2) stress weakens the body's ability to fight cancer cells (Antoni & Lutgendorf, 2007). That is, stress-weakened immune systems are more likely to allow tumor growth that they would otherwise combat.

Immune System Ready!

A large macrophage (at top) is about to trap and ingest a tiny bacterium (lower right). Macrophages and other cells of our immune system constantly patrol our bodies in search of invaders. People with a pessimistic outlook tend to release excess stress hormones that hamper their immune system's effectiveness and make illness more likely.



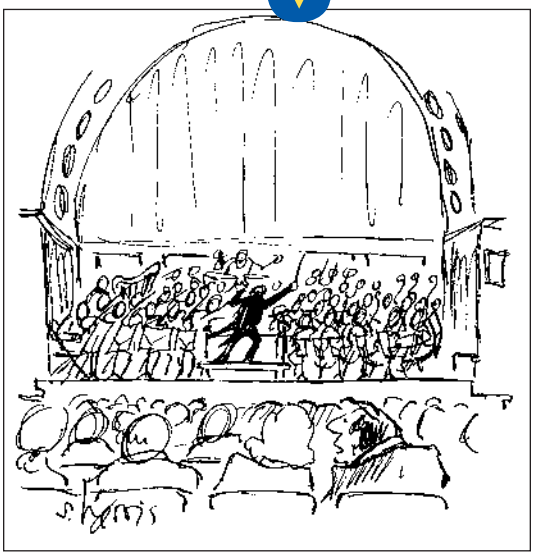
LENNART NILSSON/BOEHRINGER INGELHEIM INTERNATIONAL GMBH

Stress and Heart Disease

You've heard of one car being hit by another from behind? Although I've never been hit from behind while driving, I *have* been rear-ended in a grocery store. Where I live, grocery shopping on a Saturday morning is neither good nor unique planning. Having waited until the weekend, shoppers flood the aisles, pushing oversized shopping carts from the produce to the pickles. Every Saturday morning, there are characters trying to set the world record for speed shopping. Walking briskly, they sling food into their carts and look incredibly annoyed at

Stressful!

There are probably few "Type B" conductors.



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"Typical 'Type A' Behavior"

anyone blocking their path. At the checkout, they dart from one line to the next, looking to minimize wait time. I was in the checkout line when one of these speed shoppers rear-ended me while stealing the spot behind me from a slower shopper.

These impatient, competitive, hard-driving, verbally aggressive, and anger-prone people have what Meyer Friedman and Ray Rosenman call **Type A** personalities. These two researchers contrasted these hard-driving types with **Type B** personalities, those who are more easygoing and relaxed. The origin of these two classifications is intriguing, and their importance in understanding the link between stress and heart attack is significant.

In the mid-1950s, Friedman and his associates initially studied the eating habits of married white couples living in the San Francisco area, and they discovered an interesting fact: The women ate just as much fat and cholesterol as their husbands did, but the men were more likely to experience heart disease. Friedman ruled out sex differences (for example, female sex hormones) as a reason for this effect after finding that African-American women with similar diets were just as prone to heart disease as the men. Perplexed, Friedman could not figure out what caused the coronary differences. Then one woman in the study announced,

> If you really want to know what is going to give our husbands heart attacks, I'll tell you. It's stress . . . the stress they have to face in their businesses, day in, day out. Why, when my husband comes home at night, it takes at least one martini just to unclench his jaws. (Friedman & Ulmer, 1984)

The woman making the statement did not work outside her home, nor did most of the white women in the study. But most of the African-American women did hold jobs. Could work stress, or stress in general, be the answer?

To test the stress–heart disease link, Friedman measured blood-clotting speed and cholesterol level (both associated with heart attack risk) in tax

Occupational Hazards?

Some jobs are more stressful on your heart than others, which may increase the likelihood of heart disease.

AP PHOTO/PHILIP SCOTT ANDREWS

Type A A term for competitive, hard-driving, impatient, verbally aggressive, and anger-prone people.

Type B A term for easygoing, relaxed people.

Psychology in THE REAL WORLD

Managing Anger

Treatment for depression is readily available from clinical psychologists and physicians, but is there any treatment for anger? Is anger something people, particularly those who are Type A, should seek to overcome? In both cases, the answer is *Yes.* Psychologists suggest two ways of handling anger that are better than merely "blowing off steam," which actually tends to amplify hostile feelings (Geen & Quanty, 1977; Hokanson & Edelman, 1966). First, although it sounds simple, if you feel angry give yourself time to calm down. I was told as a young boy to "count to 10" before doing anything when I was angry with my brother. The physiological storm that anger stirs up in your body will drop below hurricane level when given time to calm down. Second, try to vent the anger by exercising, confiding in a friend, or writing in a journal. Finally, for more long-term benefits, consider taking up yoga or meditating on a regular basis. Both activities have been shown to decrease the likelihood of angry episodes (Fredrickson, 2009). These behaviors will let you sift through your feelings without stifling them and will help you avoid explosive reactions later (Baumeister et al., 1990). Also, avoid sulking, which simply allows rehearsal of the reasons for being angry.

Actively trying to control anger instead of letting it control you is effort well spent. Keep in mind the words of Charles Spielberger and Perry London (1982), who perhaps put it best when they warned that rage "seems to lash back and strike us in the heart muscle."

accountants in the months leading up to their busiest time of the year, the April 15 tax-filing deadline. In January and February, the readings were normal. However, during the incredibly intense days leading up to the deadline, with the accountants scrambling to meet their clients' deadlines and working long hours, the clotting and cholesterol readings skyrocketed to dangerous levels. In May, the readings were back to normal. Stress *did* predict risk of heart attack.

In the nine-year study that followed, Friedman and Rosenman tracked 3000 healthy men between the ages of 35 and 59, labeling each man as either Type A or Type B, based on a 15-minute interview. By the end of the study, 257 men had suffered heart attacks, and 69 percent of them were Type A. None of the "pure" Type Bs, the most easygoing, had heart attacks. (See Psychology in the Real World: Managing Anger for more on effective ways to control anger.)

The scientific world clamored for more information regarding Type A and Type B individuals. Which aspects (if any) of the Type A personality—hard-driving, verbally aggressive, anger-prone, competitive—were most toxic? The winners (or losers, depending on how you look at it) turned out to be anger and one other negative emotion—depression (Miller et al., 1996; Williams, 1993). Consider these findings:

- Those experiencing instant anger over minor annoyances, especially those with aggressive-reactive personalities, are the most prone to heart attacks (Smith & Ruiz, 2002).
- Young and middle-aged adults who get angry over little things are more likely to have heart attacks than those who let the small stuff slide (Kupper & Denollet, 2007).

- A review of 57 studies shows that depression significantly increases the risk of death by heart attack (Wulsin et al., 1999).
- Cynical and hostile college students are five times more likely to die of heart attacks in middle age than are their trusting, gentler classmates (Williams, 1989).

PAUSE NOW OR MOVE ON

Turn to page 633 to review and apply what you've learned.

It is clear that stress has a significant effect on our health. But it is also true that *how* we respond to stress matters. While the root causes of many stressors lie beyond our control, we can all seek ways to turn unhealthy stress responses into something more positive and productive.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 35

Thinking About Effects of Stress

Stress

WHAT'S THE POINT?

35-1 What is stress, and how do our bodies react to it?

- Stress is the process by which we perceive and respond to threatening or challenging events, called stressors.
- Walter Cannon found that stressors trigger the fight-or-flight response.
- Hans Selye identified the general adaptation syndrome (GAS), which describes the three phases of the body's response to stressors.
- Psychologists divide stressors into three categories: daily stress (everyday hassles like becoming stuck in traffic), significant changes (important changes in life like leaving to live at college), and catastrophes (large-scale, life-threatening events).

Apply What You Know

1. Which of the following questions would most likely interest a health psychologist?
   a. What types of parenting styles lead to the healthiest children?
   b. Which kinds of rewards are the most effective in healthy rats learning mazes?
   d. How do hypochondriacs respond to clinical therapy treatments?
   d. Does deep breathing after encountering a stressor lessen a stress reaction?
2. What are the three phases in Hans Selye's general adaptation syndrome?

Effects of Perceived Control

WHAT'S THE POINT?

35-2 What are the effects of perceived control, optimism, and pessimism on stress reactions?

- Uncontrollable stress is more physically damaging than stress we perceive as controllable.
- Optimism shields people from some damaging effects of stressors.
- Pessimism can add to the negative effect of stress.

Apply What You Know

3. True or False: Appraising a life event optimistically as a challenge rather than a threat is a poor predictor of better health.
4. A patient in a hospital shows significant improvement when she is given control over her pain medication. This example demonstrates the importance of
   a. good patient-doctor communication.
   b. perceived control over a stressor.
   c. high-quality pain control medication.
   d. being in a good hospital when in pain.

Stress and Disease

WHAT'S THE POINT?

35-3 What are the effects of stress on cancer and heart disease?

- Stress does not cause cancer or heart disease, but stress reactions affect the body's ability to fight these illnesses.
- People with Type A personalities (anger-prone, aggressive, and competitive) are more likely to experience heart disease than those classified as Type B (easygoing and relaxed).

Apply What You Know

5. Research indicates that high levels of stress
   a. create immune-boosting hormones that fight cancerous tumors.
   b. may cause cancer.
   c. negatively affect the body's ability to fight cancer.
   d. result from cancer patients verbalizing their feelings about the disease.
6. When Mya's boss accidentally misplaced the 200-page report Mya had been working on for weeks, Mya laughed and said, "No problem. Everyone loses something occasionally." Based on this example, which personality type would you say fits Mya best?
   a. Type A
   b. verbalizing type
   c. Type B
   d. anger-prone type

KEY TERMS AND KEY PEOPLE

stress, p. 622
health psychology, p. 622
general adaptation syndrome (GAS), p. 624
Type A, p. 630
Type B, p. 630
Walter Cannon (1871–1945), p. 623
Hans Selye [SELL-yay] (1907–1982), p. 624

MODULE 36

Promoting Wellness

Healthy Life-Styles
- Exercise
- Family and Friends
- The Faith Factor

Positive Experiences and Well-Being
- Flow
- Happiness
- Optimism

Overcoming Illness-Related Behaviors
- Smoking
- Obesity
- Weight Control

We all know there are physical benefits to exercising, but what are the mental benefits? How does exercise contribute to "feeling better"? Psychologists have a lot to say about wellness.

Before Jonas Salk created the polio vaccination in 1954, polio terrorized the United States. Thousands were crippled, including President Franklin Delano Roosevelt, and thousands more died. In 1984, research psychologist **Martin Seligman** had a life-changing conversation with the famous Dr. Salk.

Seligman and Salk were together at a conference where immunologists and psychologists were discussing how both fields contribute to making life better. Salk told Seligman,

> If I were a young scientist today, I would still do immunization. But instead of immunizing kids physically, I'd do it your way. I'd immunize them psychologically. I'd see if these psychologically immunized kids could then fight off mental illness better. Physical illness too. (Seligman, 1995)

Given the tenfold increase in the rate of clinical depression since the years just before World War II, an "immunization" against this particular mental illness would, indeed, make life better (Seligman, 1994). Depression makes you feel miserable. It also hurts your productivity at school and work, and it puts your physical health in

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Mental and Physical Health

Studies show aerobic exercise is good for both your muscles and your mind.

COURTESY OF MARTIN E. P. SELIGMAN, PH.D. DIRECTOR, POSITIVE PSYCHOLOGY CENTER/UNIVERSITY OF PENNSYLVANIA

MARTIN SELIGMAN (1942–) American psychologist who researched helplessness early in his career before turning his interest to optimism; he has been the primary proponent of positive psychology.

jeopardy. We could avoid much pain, sickness, and lost work time if we could stay well and never start down depression's dark path.

In this module, we explore the concept of **wellness,** which is the result of a healthy life-style and healthy attitudes. We also examine ways to promote psychological and physical well-being and to overcome behaviors that lead to illness.

Healthy Life-Styles

WHAT'S THE POINT?

36-1 What are the research findings related to wellness and exercise, social ties, and spirituality?

Several roads lead to a healthy life-style. Let's take a closer look at three of these roads, starting with exercise.

Exercise

In June 2002, President George W. Bush asked all Americans to exercise at least 30 minutes each day. In 2010, First Lady Michelle Obama initiated the Let's Move! campaign to help promote healthy life-styles in children (Obama, 2010). Their motives included improving the health of U.S. citizens and saving millions of dollars in lost productivity on the job. Time will tell if these White House initiatives increase the American population's health and lower health care bills.

Do you exercise regularly? If so, you are part of a growing minority in the United States. The physical benefits of aerobic exercise, such as increased

wellness The common result of a healthy life-style and healthy attitudes.

lung and heart fitness, are well documented. Are there psychological benefits as well? The answer appears to be a resounding *Yes*.

Many studies show that exercise is an effective, nonmedical means of reducing anxiety and depression (McMurray, 2004; Stathopoulou et al., 2006). Lisa McCann worked with a group of mildly depressed college women, assigning the women to one of three groups:

- Group A participated in an aerobic exercise program.
- Group B worked through a series of relaxation exercises.
- Group C received no treatment.

Ten weeks after the treatment programs began, those in the aerobic exercise group showed the greatest decrease in depression (see **Figure 36.1**) (McCann & Holmes, 1984). This dramatic finding illustrates that exercise can help reduce or prevent depression, the common cold of mental illness.

Physical fitness also leads to greater self-confidence and self-discipline (Stephens, 1988). Exercise lowers blood pressure while increasing our ability to deal with stress (Ford, 2002). Unfortunately, many of us bypass daily exercise because we think we need to run 5 miles a day to make a difference. Not true. Moderate exercise, such as a 10-minute walk, can increase energy levels and lower tension (Thayer, 1987, 1993).

So, we know exercise boosts mood. But *how* does aerobic exercise make us feel better? Several factors contribute:

- Exercise increases the output of the mood-boosting chemicals your nervous system produces (Jacobs, 1994; Hunsberger et al., 2007).
- Exercise enhances your cognitive abilities, such as memory, to some degree (Etnier et al., 1997).

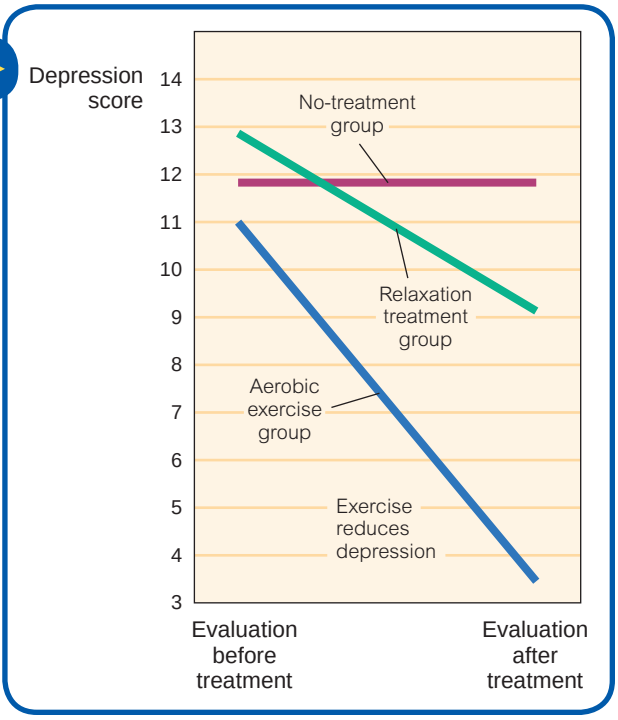


Figure 36.1
Exercise for Mental Health

Feelings of depression decreased dramatically when exercise was included as a part of treatment. (Adapted from McCann & Holmes, 1984.)

- Exercise lowers your blood pressure (Perkins et al., 1986).
- Exercise has positive side effects, such as better sleep, that provide an emotional benefit.

Regular exercise cuts heart attack risk in half (Powell et al., 1987) and increases longevity by as much as two years (Paffenbarger et al., 1986). Exercise, if done regularly in later life, also reduces the likelihood of Alzheimer's disease (Kramer & Erickson, 2007). So, after finishing your homework, why not pump up your bike tires or lace up those running shoes? (For some tips on how to begin and then maintain an exercise routine, see Thinking About Positive Psychology: Jumping the Hurdles That Prevent Exercise.)

Thinking About POSITIVE PSYCHOLOGY

Jumping the Hurdles That Prevent Exercise

You'll rarely hear someone say, "I'm glad I'm not in shape," or, "I wish I were in worse physical shape than I am now." Indeed, regardless of age, most of us wish we were in better shape. The exercise required to establish and maintain physical fitness has the added benefit of reducing stress, reducing symptoms of depression, stimulating brain cell growth, and making us feel better. Not exercising speeds up the aging process (Ratey & Hagerman, 2008).

Unfortunately, many who wish they exercised regularly often find reasons to keep their sneakers in the closet. Finding the time and the motivation to exercise can be a challenge. Positive psychology researchers have identified a number of ways to increase the likelihood you'll get into an exercise groove (adapted from Salvas, 2008).

1. *Include others.* Positive psychologist Chris Peterson said it most simply and best: Other people matter. Exercise with someone you enjoy and who will encourage you to get out there even when you don't feel like it.
2. *Get your sleep.* Overcoming a lack of preexercise energy is a huge obstacle. Turn off the television (or computer) and get your sleep.
3. *Keep track of progress.* Keep track of what you do and when you did it by using a personal or public blog, a wall calendar, or some other record-keeping device. What you measure winds up becoming more valued.
4. *Improve your mood before exercise.* Happy moods increase our activity levels (Lyubomirsky, 2008). Listen to some of your favorite upbeat music or call a fun friend for an update before hitting the gym.
5. *Match the challenge with your skills.* Avoid setting your immediate sights on a 20-minute jog if you have yet to run for 10 consecutive minutes. Instead, consider initially aiming for two 10-minute jogs if 20 minutes is your goal.
6. *Peak your endings.* Research shows that we often remember something by how much we liked the ending (Schwartz, 2004). Structure workouts so that you finish by doing something you really enjoy.
7. *Use your strengths.* If you haven't yet done so, take an online test that helps determine your strengths. (The Brief Strengths Test can be found at www.authentichappiness.org.) Use your strengths to help work up a sweat. So, if a love of learning is one of your top strengths, explore machines at a gym that you've never tried. If bravery is in your top five, call upon this strength to contact people who can help you get started, even if you've never met them (for example, a neighbor who is in good shape or a trainer at a fitness club).

The answer to the question of whether we should or should not exercise is obvious; what's tougher is how to find the motivation we need to get our hearts pumping. If you or someone you know is having trouble getting started, perhaps the above list will help. It's never too late to commit to be fit.

Family and Friends

What, if anything, has caused you emotional strain in the past 24 hours? Think about that for a moment. The most common answer, according to a good news–bad news research finding, is "family" (Warr & Payne, 1982). This is understandable. Each day, families juggle time, energy, and resources in an attempt to satisfy each person's needs for food, transportation, and belonging in today's increasingly busy world. The results often include stress, which can be toxic to our bodies. It can lead to heart disease, suppress the immune system, and contribute to high blood pressure.

However, the good news is that the family juggling act also brings happy moments. When the same researchers asked *what had prompted pleasure* in the previous 24 hours, the answer again, by an even larger margin, was "family." The close relationships found in families and with some good friends are most often sources of happiness. Family and friends offer social support, making us feel liked and wanted. This social support provides the cognitive rewards of happiness and contentment. Several studies have also linked social support to health and wellness:

- People with more social ties (family, friends, support groups) are less likely to die prematurely (Cohen, 1988).
- Heart attack victims living alone are twice as likely to have another heart attack within six months as are those living with a family member (Case et al., 1992).
- An amazing study followed children with high IQ scores for 70 years. Regardless of economic status, the children who grew up with parents who did not divorce outlived the children of divorce by an average of 4 years (Schwartz et al., 1995). Do intact families provide more social support for children? Probably.

Married people tend to live longer than those unmarried (Kaplan & Kronick, 2006), but a marriage filled with conflict is not good for the health of either spouse (De Vogli et al., 2007). Marriage itself is not the predictor of health, but a healthy, happy marriage predicts fewer heart attacks, less obesity, and lower cholesterol rates (Nielsen et al., 2006).

One of the more compelling and ingenious attempts to examine the relationship between a healthy social environment and the functioning of immune

Joy and Strife

Our family members sometimes bring us stress, but they also bring us support and happiness.

PHOTOLIBRARY

systems involved a study of 276 participants. Each participant agreed to allow drops of a cold germ–laden liquid to be dripped into their healthy noses. What these researchers found is nothing to sneeze at: Those with the most social ties were less likely to catch a cold and also produced less mucus. (How they measured the mucus, I'm not quite sure.) The study's results showed that social support aids in resisting the common cold (Cohen, 2004; Cohen et al., 1997).

Close friends and relationships create social ties that appear to be beneficial in a number of ways. The opportunity to confide in others, for example, lowers blood pressure, slows the heart rate, and decreases the level of stress hormones in your body (Graham et al., 2006).

So, do all these findings mean that your health is destined to fail if you have a messed-up family and no trustworthy friends? Not necessarily. We all have access to a wide range of support groups if we know where to look for them. Group membership can provide the sense of belonging that is so beneficial to emotional and psychological health. Many local schools and religious organizations sponsor support groups, and your school counselor should be able to point you in the right direction if you're interested in exploring the possibilities.

Stress is unavoidable, but the help and encouragement of family, friends, and support groups provide a buffer against the ill effects of stress. Another buffer for many is the *faith factor*.

The Faith Factor

Do religion and spirituality relate to health? One poll showed that 80 percent of all Americans believe they do (Matthews & Larson, 1997). But is it possible to assess this relationship scientifically? Several researchers have tried, and they found a *correlation* between being religiously active and having longevity (McCullough & Laurenceau, 2005). This means the researchers found that certain factors tend to occur together, but they did not do follow-up experiments that would show cause and effect. In this study, they found that people from a variety of religious backgrounds who attended religious services regularly tended to live longer than those who attended infrequently. Another study followed 21,204 people for eight years (Hummer et al., 1999). These researchers found that people who did not attend religious services were 1.87 times more likely to have died than were those who attended services weekly (see **Figure 36.2**). Put another way, the life expectancy of a 20-year-old in this

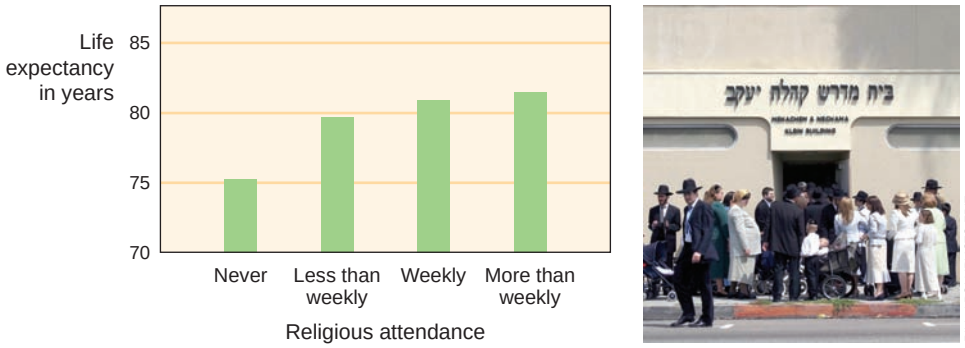


Figure 36.2
The Faith Factor?

People who frequently attend religious services tend to live longer than those who do not attend. (From Hummer et al., 1999.)

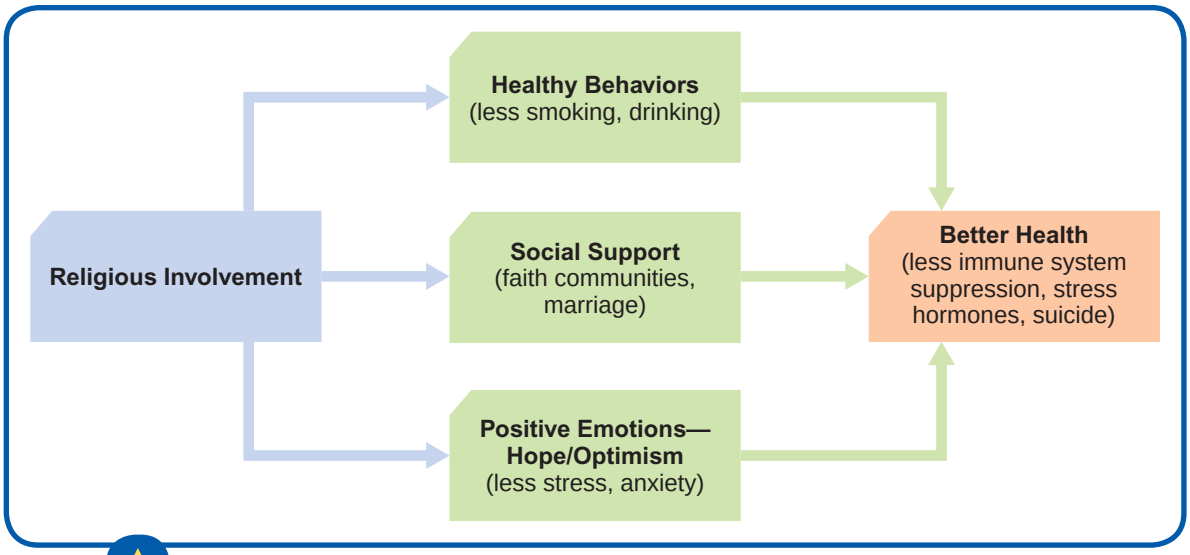


Figure 36.3
Explaining the Faith Factor

The effect of religion on health has many dimensions.

study would be 83 years for the most frequent attendees and 75 years for nonattendees. This eight-year difference certainly ranks up there with the positive effects of exercise and nonsmoking.

Does this mean that your life expectancy will go up if you start attending religious services frequently? Not exactly. We cannot say that religious involvement guarantees wellness and longevity. What we can say is that at least three factors associated with the religiously active seem to contribute to better health (see **Figure 36.3**):

1. The beliefs of the religiously active often promote healthier life-styles. Religiously active people smoke and drink less (Park, 2007), and get more sleep than those who, say, stay up all night partying.
2. Attending religious services is a communal, not a solo, experience. Faith communities provide social support (Ai et al., 2007). When members of one of the 350,000-plus faith communities in North America fall down, the other members are there to help pick them back up.
3. Religiously active people often experience less anxiety and stress because of a worldview promoting optimism, gratitude, and hope for the future. Optimists have stronger immune systems than do pessimists. Religiously active people have stronger immune systems and have fewer hospital stays than do religiously inactive people (Koenig et al., 1997; Koenig & Larson, 1998).

The relationship between spirituality and health has not escaped the notice of the nation's medical schools. In 1994, only 3 of America's 126 medical schools offered courses in spirituality and health. By 2005, 75 percent of them did (Koenig, 2002; Puchalski, 2005). The ongoing research in this area, a direct result of renewed interest in studying the relationship between health and faith, may yield new and helpful information in the coming years.

PAUSE NOW OR MOVE ON

Turn to page 651 to review and apply what you've learned.

Positive Experiences and Well-Being

WHAT'S THE POINT?

36-2 What is the relationship between wellness and flow experiences, happiness, and optimistic explanatory styles?

Experience success in the classroom, on the ball field, or with a Wii remote in your hand, and you feel some degree of happiness. When we're happy, we're more likely to forgive the friend who borrowed a pencil and didn't give it back, to help those who do not understand an assignment, or to tolerate the driver who cuts us off in traffic. Wouldn't it be great if we could "bank" these positive experiences after they occur, building up a reserve that would help get us through rough times? And could this reserve then "inoculate" or help prevent us from becoming depressed during difficult times, as Jonas Salk had hoped? The answer is a solid *Yes*.

Years after his conversation with Salk, Martin Seligman and many others began promoting the subfield of psychology called **positive psychology** by studying emotions, feelings, and the positive experiences that foster well-being and allow us to thrive. Ed Diener (2002) explains *well-being* as a "concept that includes life satisfaction, feelings of fulfillment, pleasant emotions, and a low level of unpleasant emotions." Experiences (including both thoughts and feelings) that produce pleasant emotions lead a person to judge life as satisfying, fulfilling, and "going well." For example, if a goal of yours is to earn an A in your psychology class and you earn a 97 percent on a test, seeing that grade will be a positive experience that promotes your well-being. Why are positive experiences important? Research (Cohn, et al., 2009; Fineburg, 2000) shows that the more positive experiences you have, the more likely you are to

- have better relationships with others.
- contribute more to your community.
- excel in academics and sports.
- provide leadership.
- propose new ideas in such areas as science and business.
- help others.
- be less of a drain on psychological and physical health systems.

But note that, as of this writing, most research linking well-being and positive experiences is *correlational*. We don't know which is the cause and which is the effect. Do the positive experiences cause all these wonderful characteristics to exist in the people who have them? Or do people who already have these wonderful characteristics tend to have experiences that are more positive? One thing is clear: Our potential for well-being consists of the goals that are important to us and the degree to which we are achieving those goals.

positive psychology A movement in psychology that focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive.

PETER HVIZDAK/THE IMAGE WORKS

In the Flow

A challenge-requiring skill, clear goals, and feedback can become a flow activity.

Researchers in positive psychology have found at least three kinds of experiences that have powerful effects on the individual. Flow, happiness, and optimism all contribute to our sense of well-being.

Flow

Flow, defined by Mihaly Csikszentmihalyi (pronounced chick-SENT-me-hi; 1990), is a state of optimal experience. Activities we perform for the satisfaction of doing them, and not for extrinsic rewards, put us in a state of flow. Reading a book we can't put down, playing a game of three-on-three basketball in the driveway with friends, or acting in the school play can all be flow experiences. People in flow situations report losing track of time and being hard to distract. They also lose any sort of self-consciousness about their appearance or other people's opinions of them. Let's take a closer look at flow, using the basketball example.

For flow to occur, we need a challenge-requiring skill. A challenging activity requiring highly developed skills that you have cultivated leads to flow. An activity that is not challenging and requires little or no skill leads to apathy (see **Figure 36.4**). Playing basketball (a real challenge for me) meets this requirement; watching television does not. Clear goals (trying to put the ball in the hoop, keeping someone else from scoring, winning the game) and feedback (each basket counts for 1 point, first team to 11 wins) are also flow necessities.

Flow can happen in all areas of life, including the workplace. You may have a job where you are so bored that you count the minutes until it's time to leave. Perhaps you work there only for the money. Such a job is sheer drudgery, a direct contrast to flow. In what kind of job might you experience flow every day? Teaching? Acting? Writing? You may want to keep that question in

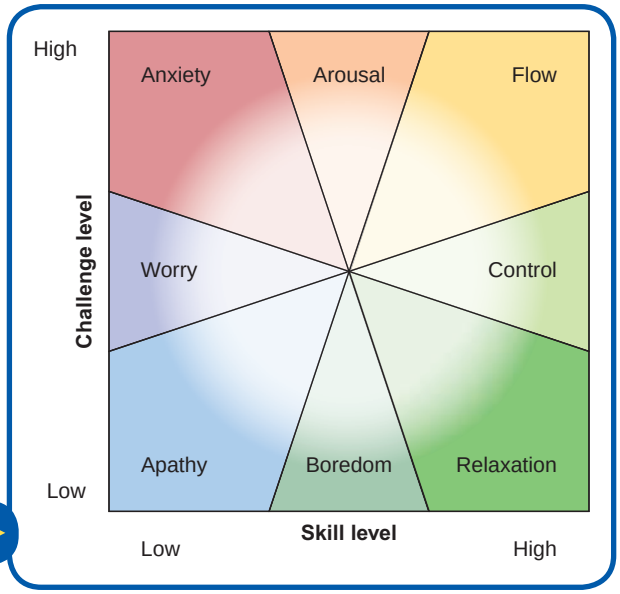


Figure 36.4
Achieving Flow

This figure shows the relationship between challenges and skills in achieving flow. Note that to experience flow, the activity needs to be higher than average in both challenge and skill. (Adapted with permission from Csikszentmihalyi, 1998.)

flow A state of optimal experience that involves a challenge, requires skill, has clear goals, and provides feedback.

mind as you think about employment after graduation or select your major in college.

Flow is a subjective experience that contributes to another kind of positive experience: happiness.

Happiness

You walk into school, and the first person you talk to says, "Nice haircut—looks sharp," bringing a smile to your face. Next, you go to class and find that the project you worked on for two weeks received a better grade than you'd anticipated. Finally, you solve a math problem that is giving most of your classmates a struggle. If you then begin helping your classmates solve that problem, a psychologist would not be surprised. Research shows that when we're happy, we're more likely to help others (Diener, 2000; Diener & Tov, 2007). Happy people also make decisions more easily (Isen & Means, 1983). They cooperate more (Forgas, 1998). And they live longer, complain less, and recover more quickly from injury (Diener & Biswas-Diener, 2008).

Of course, not everyone responds to "Nice haircut" in the same way. I'll bet you know someone who would say, "What? Didn't you like my hair before?" How can the same event lead to happiness in some and gloom or distress in others? Part of the answer may lie in several qualities and tendencies that happy people possess (see **Table 36.1**). Compared with their less happy counterparts, happy people tend to be more outgoing, interact more with others, have a larger circle of friends, and participate in more rewarding activities. Having more friends often provides more social support and more opportunities for affection. Happy people also have a higher sense of personal control over their lives and exhibit higher levels of hope when facing challenges. Hope, according to Rick Snyder (1994; Snyder & Lopez, 2007), is a better predictor of how well a student will do in college than the standardized tests students take to get in. Optimistic attitudes, as you will see next, provide health bonuses as well.

Table 36.1

Happiness

Researchers Have Found These Factors in Happy People	Happiness Does *Not* Seem Greatly Related to These Factors
High self-esteem (in Western countries)	Age
An optimistic, outgoing, and agreeable personality	Gender (women are more often depressed but also more often joyful)
Close friendships or a satisfying marriage	Education levels
Work and leisure that engage their skills	Parenthood (having children or not)
A meaningful religious faith	Physical attractiveness
Sufficient sleep and exercise	

Source: Summarized from DeNeve and Cooper (1998), Myers (1993, 2000), and Myers and Diener (1995, 1996).

explanatory style Habits we have for thinking about the good or bad causes of events.

Optimism

You've probably heard phrases like "Optimists see the glass as half full; pessimists see it as half empty." But what is the difference between an optimist and a pessimist? *Optimism* is the belief that bad events

- are temporary.
- are not your fault.
- are not indicative of how things usually are.

Pessimism is the opposite of optimism—the tendency to expect the worst. Let's look more closely at these contrasting attitudes, using the common situation of being let down by a friend. Imagine that the weekend is approaching and you're making plans for Friday night. Your friend Chris says, "I'll text you when we get where we're going." You wait for the text, but it never comes. How would you explain this to yourself? Would you assume Chris blew you off and didn't want to do anything with you? Or would you suppose something came up that kept your friend from texting? More specifically, which of the following phrases would best describe your reaction?

1. "I didn't get a text because Chris really doesn't like me."
2. "Maybe Chris wanted to text but had a dead cell phone."
3. "I wonder what came up that kept Chris from texting?"
4. "Chris doesn't really want to hang out with me Friday or any day."

The way you answered that question may give some clues to whether you are optimistic or pessimistic. Our habits for thinking about causes of good or bad events determine whether we have an optimistic or pessimistic **explanatory style.** People with an optimistic explanatory style are more likely to think of reasons 2 and 3, which provide temporary explanations that do not create a personal reason or fault for Chris's failure to call. Those with a pessimistic explanatory style would be likely to choose options 1 and 4, which place the blame on themselves and are permanent in nature.

Why is this optimism-pessimism thing important to wellness? In addition to spending less time in hospitals, healing faster, and living longer,

Still Waiting

What do you think is this person's explanatory style?

ALEKSEJ VASIC/ISTOCKPHOTO

optimists are far less likely to become depressed (Sapolsky, 2005; Seligman, 1991, 1994). Fortunately, if you lean more to the pessimistic side and want to avoid some of the side effects of the negative explanatory style, there are steps you can take to think more positively about both good and bad events (see Thinking About Positive Psychology: Techniques for Overcoming Pessimism).

Thinking About POSITIVE PSYCHOLOGY

Techniques for Overcoming Pessimism

Too much optimism can result in an inappropriate lack of responsibility, but pessimism—expecting the worst or explaining bad events in the worst way—can lead to sadness, passivity, and depression. Developing a positive explanatory approach can help most people overcome pessimism.

Studies conducted under the supervision of Martin Seligman (1995) showed that changing from a negative to a positive explanatory style is possible and is especially beneficial for people at risk for depression. Most of these studies dealt with children identified as prone to depression. Those who went through a program to change their thinking style were far less likely to show depressive symptoms later in life than those who did not go through the program.

There are at least two techniques for overcoming pessimism—distraction and disputation (Reivich et al., 2011; Seligman, 1998). The first technique, *distraction,* attempts to delay the pessimistic thought until a more appropriate time. Distraction is especially useful when a situation requires immediate action and negative thoughts could prove disastrous. Soldiers approaching an enemy outpost, for example, must somehow distract themselves from such thoughts as "I could be killed," thoughts that could cause hesitation and possibly death.

Disputation, the second technique, is arguing with oneself about pessimistic beliefs. A longer-lasting technique than distraction, disputing pessimistic thoughts changes reactions from dejection to optimism. We can dispute pessimism in at least four ways (Fineburg, 2000):

- *Distancing*—Realizing that negative thoughts are usually unfounded helps distance us from pessimism's destructiveness. We do not tolerate insults about ourselves from others. Why accept them from ourselves? Do not think after a bad test score, "I'm a stupid idiot." Instead, think, "I didn't do well on *this* test."
- *Checking for evidence*—Evidence from other times and places can disprove a pessimistic belief. You may have received a bad math score this time, but that doesn't make you a failure at math. What about your score on a previous test, a homework assignment, or some other standardized test?
- *Considering alternatives*—Bad events often have multiple explanations, but pessimists usually focus on the most harmful and defeating. Instead of thinking, "I'm stupid and I'll always stink at math" (a personal and permanent thought if there ever was one), think of explanations that pinpoint nonpersonal, specific, and changeable causes for the event. Your math score was bad, but did you study enough? Did you study effectively? Did other tests scheduled for the same day divide your attention?
- *Minimizing catastrophic thinking*—Finally, what if the negative thought is correct? If math is not your strength, realizing that this is not the end of the world can ease the pain brought by this belief. It may be that math is not your strong suit, but you have other gifts.

PAUSE NOW OR MOVE ON

Turn to page 652 to review and apply what you've learned.

Overcoming Illness-Related Behaviors

WHAT'S THE POINT?

36-3 What makes it difficult to quit smoking or lose weight?

Some behaviors increase our chances of becoming ill. Two of these behaviors are smoking and being significantly overweight.

Smoking

SNAPSHOTS

JASON LOVE

If a bus crashed, killing all 50 passengers aboard, this would be tragic. Imagine 25 of those buses crashing every day for a year and you have roughly the same number of annual deaths caused by smoking in the United States alone! With this kind of death rate, you'd think the public outcry to ban the sale of cigarettes would echo around the globe. Sadly, the World Health Organization (2005, 2008e) predicts that 10 million people will soon be dying annually from smoking, meaning that a billion people (that's billion, not million) could die from smoking this century. Smoking is a killer.

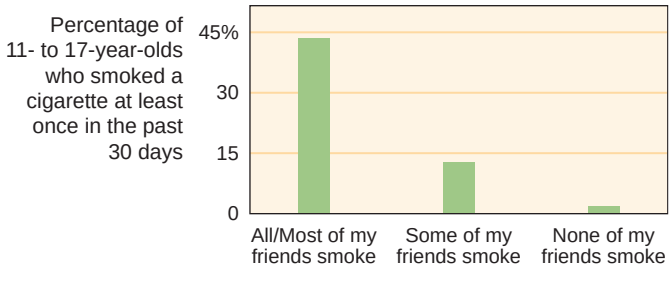
If you start smoking in your teens and never quit, you have a 50 percent chance of dying a premature and agonizing death from your addictive habit. This is an especially dangerous time for you, because almost all smokers start as adolescents, often to try to look older or to gain acceptance from peers (Cin et al., 2007) (see **Figure 36.5**). If your parents, siblings, and friends smoke, the chances are higher that you'll light up as well. Students who drop out, receive poor grades, or feel less control over their futures are also at a high risk (Chassin et al., 1987; Schulenberg et al., 1994). But for those of you who haven't started smoking by the time you graduate from high school, the odds are tremendously low that you'll ever start this habit. And if your best friends and parents are nonsmokers, those odds drop to almost zero (Moss et al., 1992).

We know smoking is bad for our lungs and heart. But smokers suffer other health risks:

- Smokers have high rates of depression and divorce (Doherty & Doherty, 1998; Vita et al., 1998).

Figure 36.5
Peer Pressure

You are less likely to start a bad habit like smoking if your friends don't smoke.


Percentage of 11- to 17-year-olds who smoked a cigarette at least once in the past 30 days
45%
30
15
0
All/Most of my friends smoke
Some of my friends smoke
None of my friends smoke

- Smokers lose 12 minutes off their life for every cigarette (*Discover,* 1996).
- Smokers are 3 times more likely than nonsmokers to drink alcohol (National Institute on Alcohol Abuse and Alcoholism, 1998).
- Smokers are 17 times more likely than nonsmokers to smoke marijuana (National Center for Health Statistics, 1992).
- Smoking harms nearly every organ in your body (World Health Organization, 2005).

PAUL J. MILETTE/PALM BEACH POST

Kick Butts!

Some communities plan special days to encourage smokers to kick the habit.

So, why don't teenage smokers throw out their cigarettes when they learn these facts? In part, it's because nicotine is even more addictive than cocaine or heroin: One in three people who try cigarettes becomes hooked (Heishman et al., 1997). The craving for nicotine sets in quickly; even attempts to quit within the first weeks of smoking often fail (DiFranza, 2008). Also, the withdrawal symptoms that accompany attempts to quit are horrible: Insomnia, anxiety, craving, and irritability are a few of the symptoms, all of which can be relieved by just a few puffs.

In contrast, the addictive qualities of nicotine are numerous and rewarding. Nicotine calms anxiety, boosts awareness, suppresses appetite, and reduces sensitivity to pain. These effects of nicotine surely compound the difficulty smokers face when attempting to kick the habit, even when they know death looms as a long-term smoking result.

Almost half of all smokers try to quit each year. For those who try to quit, the success rate is about 14 percent. If you have friends or relatives who would like to quit, you might want to pass along these 10 guidelines, published by the U.S. Agency for Health Care Policy and Research, as a way to improve their odds (Wetter et al., 1998):

1. Set a quit date.
2. Inform family and friends.
3. Get rid of all cigarettes.
4. Review things you learned from previous attempts to quit and anticipate challenges.
5. Use a nicotine patch or gum.
6. Be abstinent—not one puff.
7. Avoid alcohol (which leads to relapse).
8. If other smokers live or work with you, quit together.
9. Avoid places where others are likely to smoke.
10. Exercise; research shows higher success rates in quitters assigned to regular physical activity (Bock et al., 1999).

Smoking is an illness-related behavior you can control from the outset: Never try smoking, and you'll never be a smoker. We have less control over body weight, the next topic.

body mass index (BMI) An individual's weight in kilograms (pounds multiplied by 0.45) divided by squared height in meters (inches divided by 39.4). American government guidelines encourage a BMI under 25. The World Health Organization and many countries define obesity as a BMI of 30 or higher.

Obesity

Obesity rates are on the rise. More than one-third of all adults in the United States are obese, a percentage that has doubled in my lifetime (CDC, 2007). Australia, France, and Canada are not far behind. Some have called the worldwide obesity increase a "global epidemic," not least because of the related rise in serious diseases such as diabetes (Yach, et al., 2006).

Obesity's health risks are not as clear-cut as those connected to smoking. Still, people who are obese, with a **body mass index (BMI)** of 30 or more, face an increased risk of diabetes, high blood pressure, heart disease, arthritis, sleep disorders, and certain types of cancer, according to the National Institutes of Health (1998). In addition to the physical health risks, obesity carries significant mental health risks. Obesity affects how we think about ourselves and how others think about us and treat us. Seriously overweight people are often stereotyped as sloppy, slow, and lazy (Crandall, 1994; Ryckman et al., 1989). Researchers observed this type of discrimination in a study in which professional actors pretended to interview for a job (Pingitore et al., 1994). The researchers videotaped the actors in two different situations, giving the same answers to the same questions and using the same voice intonation and gestures (see **Figure 36.6**).

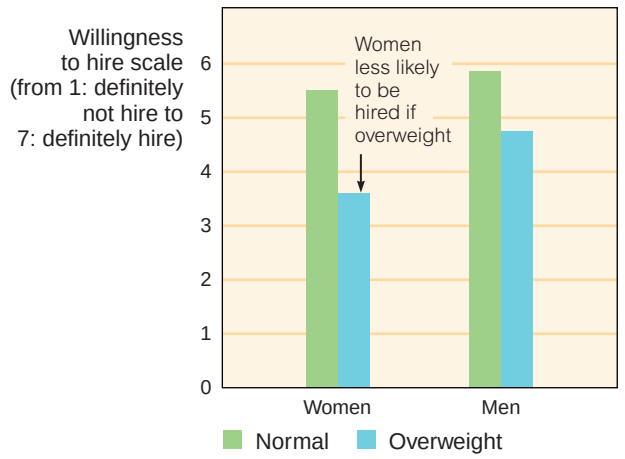


Figure 36.6
Discrimination

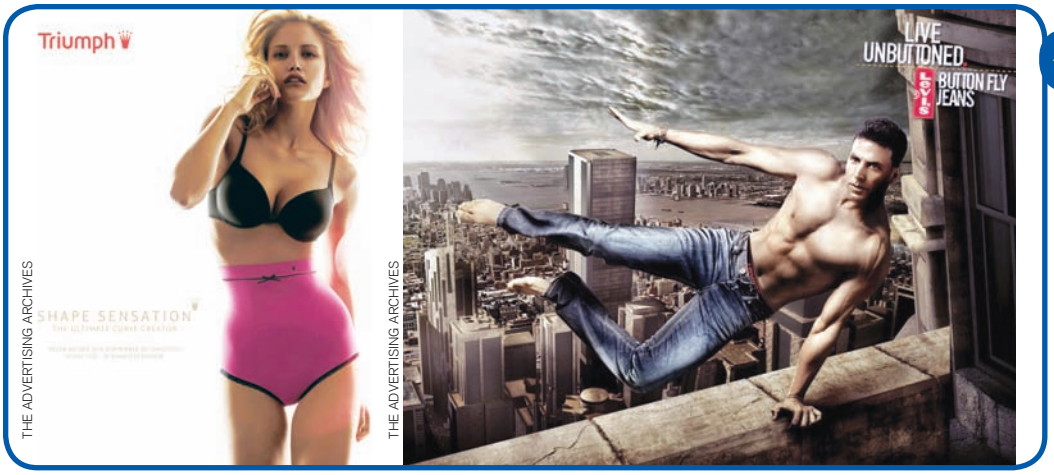
Overweight individuals, especially women, are less likely to be hired than are normal weight individuals. (From Pingitore et al., 1994.)

The only difference between the two videotapes was the apparent weight of the job applicant. In one tape, the actors were their normal, average-weight selves. In the other, makeup and padding were added to make the actors look 30 pounds heavier. The researchers then assigned participants to view one of the two tapes and rate their willingness to hire the person. Those evaluating the "obese" applicant routinely rated the heavy person as *less worthy* of hiring. Discrimination against obese people rivals race and gender discrimination, and it occurs at every employment step from hiring and compensation to promotion and dismissal (Roehling, 2000; Roehling et al., 2007). This discrimination is unfair, given the physiology of fat.

Weight Control

Have you ever wondered, "How does so-and-so eat that much but never gain any weight?" Do you have friends or relatives who always seem to be on some sort of diet but never make much progress in their attempts to lose weight? Are the people who buy the plus-size clothes merely gluttons who can't control the urge to eat? Let's unravel the mystery that is weight control.

The thin look has not always been "in," as it is today. Look at the paintings reflecting European high society centuries ago, and you'll see that being round, even rotund, was viewed as desirable. Obesity is still valued in countries where huge supermarkets are not found. In areas where famine strikes regularly, obesity often signifies wealth and social status (Furnham & Baguma, 1994).



Desired Look

Compared with similar ads from 50 years ago, today's advertisements promote unrealistic body images.

Our ability to store energy in fat cells reflects the feast-or-famine life-style our ancestors faced thousands of years ago. Fat is the perfect fuel reserve. We draw from it when food is scarce. But now that most Americans live in a world where sweets and fatty foods are abundant, our genetic program for storing energy in fat cells is about as outdated as 1980s software. With today's increased food availability, an increasing number of folks are carrying more weight than they should.

We need to make sure we draw a line between the moderately overweight and the obese. Being a little overweight does not pose near the health risks of obesity (Gibbs, 2005). However, obese 40-year-olds die an average of three years earlier than those considered slim at the same age (Peeters et al., 2003). Sadly, once the pounds are on, most find it difficult to take them off.

So, how can we lose our excess pounds? The energy equivalent of a pound of fat is 3500 calories. But cutting 3500 calories from our food intake won't drop our weight by 1 pound. To understand why weight loss is not that simple, you have to know a bit more about fat cells, set point, and metabolism.

The average adult has about 30 billion fat cells. As we take in more calories than we need, these cells enlarge. Once fat cells reach a certain size, they divide and create more cells. Does dieting reduce the number of fat cells? *No.* Dieting only reduces the *size* of these cells, all of which remain ready to grow again once we resume a higher-calorie regime (Sjostrom, 1980; Spalding et al., 2008).

A second reason that reducing your diet by 3500 calories does not automatically cause you to drop a pound relates to your **set point**—a "weight thermostat" set to keep your body weight within a certain range. If your weight drops below your set-point range, your body thinks, "Famine!" and attempts to conserve energy by increasing your hunger and slowing your metabolism—the rate at which you burn calories. To make things worse, when your diet ends and you start eating normally, your body remains in this energy-conservation mode. The amount of food that formerly *maintained* your normal weight may now actually *increase* your weight.

Metabolic rates vary from person to person. You and a friend who is your height and weight may eat the same amount of food, but one of you may put

set point The point at which an individual's "weight thermostat" is supposedly set; when the body falls below this weight, an increase in hunger and a lowered metabolic rate may act to restore the lost weight.

Human Fat Cells

Fat cells like these divide after reaching a certain size. Dieting reduces the size of each fat cell, but dieting cannot reduce the overall *number* of fat cells.

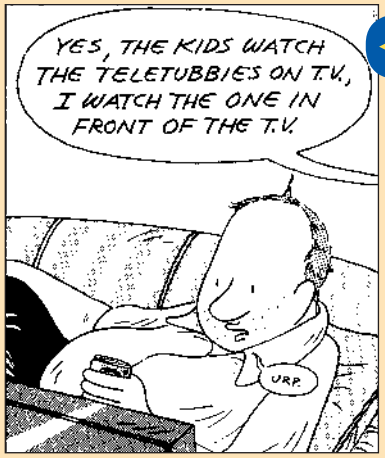
SCIENCE PHOTO LIBRARY/PHOTO RESEARCHERS, INC.

Psychology in THE REAL WORLD

Losing Weight

Your physiological deck may be stacked against weight loss. Still, if you (or a friend) are looking to shed a few pounds, here are some hints that may prove helpful:

- *Reduce exposure to tempting food cues.* Keep the chips and ice cream out of the house, and don't go near sweet shops. Never, ever go to the supermarket when you're hungry.
- *Boost your metabolism.* Exercise speeds up your metabolism and lowers your set point. Walking, jogging, and swimming empty fat cells, build muscle, and make you feel better.
- *Be patient, realistic, and moderate.* Extreme thinness is riskier than moderate heaviness (Ernsberger & Koletsky, 1999). The National Institutes of Health says that a reasonable amount of time to lose 10 percent of your body weight is six months.
- *Permanently change the food you eat.* You can modify both your hunger and your metabolism by eating foods with more fiber and color (the natural kind) and less fat, salt, and sugar, as well as by eating more fruits and vegetables. The sugar in fruits stimulates less hunger-producing insulin than the refined sugar in soft drinks, candy, and Lucky Charms.



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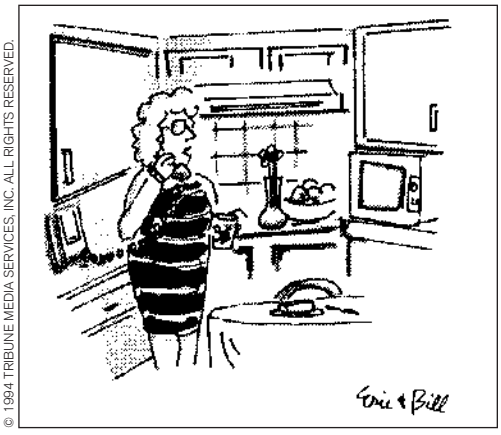
Couch Potato?

Watching television will not boost your metabolism.

- *Control your portions.* Eat slowly to give your body a chance to send "I'm full" signals to your brain. Don't stuff yourself, and don't feel obliged to finish the oversized portions you'll receive in many restaurants.
- *Don't skip breakfast and lunch to eat a big dinner.* This eating pattern slows metabolism and is common among overweight people.
- *Set attainable goals.* You guarantee defeat if you set your target weight unrealistically low. Realistic goals, like exercising three times per week, can build a sense of persistence.

BOTTOM LINERS



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"It works as well as most other diet plans. . . . I've lost over $200 in less than three weeks."

on pounds while the other does not, even though you both maintain the same activity level. If your resting metabolism is slower than your friend's, you'll be the one who burns fewer calories, making you prone to weight gain (see Psychology in the Real World: Losing Weight).

The roots of your metabolic rate are genetic. Genes may also determine how quickly your brain receives a "full" signal once you start eating and the efficiency with which you convert extra calories to fat. Will there someday be a pill that blocks the chemical "time-to-eat" messages in your nervous system? For some overweight people, such a pill may be the only way to overcome the physiology of obesity. Ultimately, it is better to accept a few pounds than to slip into a continual state of guilt over weight that leads to diets and binging.

PAUSE NOW OR MOVE ON

Turn to page 652 to review and apply what you've learned.

The goal of wellness is important and worthy. The good news is that wellness can be strengthened through healthy attitudes and a healthy life-style. One could easily argue that we'd be better off in our schools (and communities) if we were just as concerned about wellness as we are about standardized math scores. So, challenge yourself, your peers, and your family to make physical and psychological well-being part of the daily routine. You'll never regret increasing the wellness in yourself and in those you love and respect.

SUMMARY AND FORMATIVE ASSESSMENT

MODULE 36

Thinking About Promoting Wellness

Healthy Life-Styles

WHAT'S THE POINT?

36-1 What are the research findings related to wellness and exercise, social ties, and spirituality?

- Exercise is an effective, nonmedical way to reduce anxiety and depression and has many specific, positive benefits, including improving mood, enhancing cognitive abilities, lowering blood pressure, and improving sleep. Physical fitness leads to greater self-confidence and self-discipline.
- Social ties are important to overall wellness.
- Spirituality is positively correlated with aspects of wellness such as longevity.

Apply What You Know

1. _____ is the common result of a healthy life-style and healthy attitudes.
2. Which of the following statements best describes the relationship between social ties and wellness?
   a. Family relationships have less effect on wellness rates than relationships with friends.
   b. Relationships with family and friends are often a source of stress, and social ties are positively correlated with heart disease.
   c. Family relationships are often a source of stress, but the social support that families offer is important to wellness.
   d. No relationships with family and friends cause higher rates of social ties and wellness.

Positive Experiences and Well-Being

WHAT'S THE POINT?

36-2 What is the relationship between wellness and flow experiences, happiness, and optimistic explanatory styles?

- Flow experiences contribute to happiness and wellness.
- Happy people tend to be more outgoing, interact more with others, have a larger circle of friends, participate in more rewarding activities, have a higher

sense of personal control over their lives, and exhibit higher levels of hope when facing challenges.

- People with optimistic explanatory styles are more physically healthy, live longer, and are far less likely to become depressed than people with pessimistic explanatory styles.

Apply What You Know

3. A state of optimal experience that involves a challenge, requires skill, has clear goals, and provides feedback is called _____.
4. How would a person with an optimistic explanatory style explain failing a psychology exam?
   a. Psychology is a subject I'll never succeed in.
   b. I failed because I didn't study enough.
   c. Everybody else is better at this.
   d. This test shows I'm not smart.

Overcoming Illness-Related Behaviors

WHAT'S THE POINT?

36-3 What makes it difficult to quit smoking or lose weight?

- Smoking is an addictive habit correlated with depression, divorce, premature death, alcoholism, and other drug abuse. One in three people who try cigarettes becomes hooked, and withdrawal symptoms such as insomnia, anxiety, craving, and irritability make quitting difficult.
- Our metabolic rate, the rate at which we burn calories, is genetically predisposed.
- The set point influences our metabolic rate, making weight loss more difficult.

Apply What You Know

5. What is the term used to describe an individual's "weight thermostat"?
6. People who do not start smoking by the time they graduate high school
   a. are unlikely to ever start smoking.
   b. don't have the genetic predisposition for smoking.
   c. are at high risk for starting smoking during college.
   d. probably have parents who smoke.

KEY TERMS AND KEY PEOPLE

wellness, p. 635
positive psychology, p. 641
flow, p. 642
explanatory style, p. 644
body mass index (BMI), p. 648
set point, p. 649
Martin Seligman (1942–), p. 634

APPENDIX A

Careers in Psychology

Types of Psychologists
- Academic Psychologists
- Psychologists Who Solve Problems

Ever pondered pursuing a career in psychology? There are lots of options.

The most popular college major in the country is business. The second most popular major is psychology (Princeton Review, 2005). More than 88,000 college students graduate annually with a degree in psychology (U.S. National Center for Education Statistics, 2007).

Types of Psychologists

WHAT'S THE POINT?

A-1 What are some of the different kinds of jobs that psychologists do?

Why is a psychology major so popular? Yes, psychology is incredibly interesting, but psychology can also prepare you for a number of jobs after you graduate. **Table A.1** shows the top 10 occupations for people who graduate

Table A.1

Top 10 U.S. Occupations That Employ People With a Psychology Degree

1. Top- and mid-level managers, executives, administrators
2. Sales occupations, including retail
3. Social workers
4. Other management-related occupations
5. Personnel, training, labor relations specialists
6. Other administrative occupations
7. Insurance, securities, real estate, business services
8. Other marketing and sales occupations
9. Registered nurses, pharmacists, therapists, physician assistants
10. Accountants, auditors, other financial specialists

Source: Fogg et al. (2004).

with a bachelor's degree in psychology, the degree college undergraduates typically earn after four years of study.

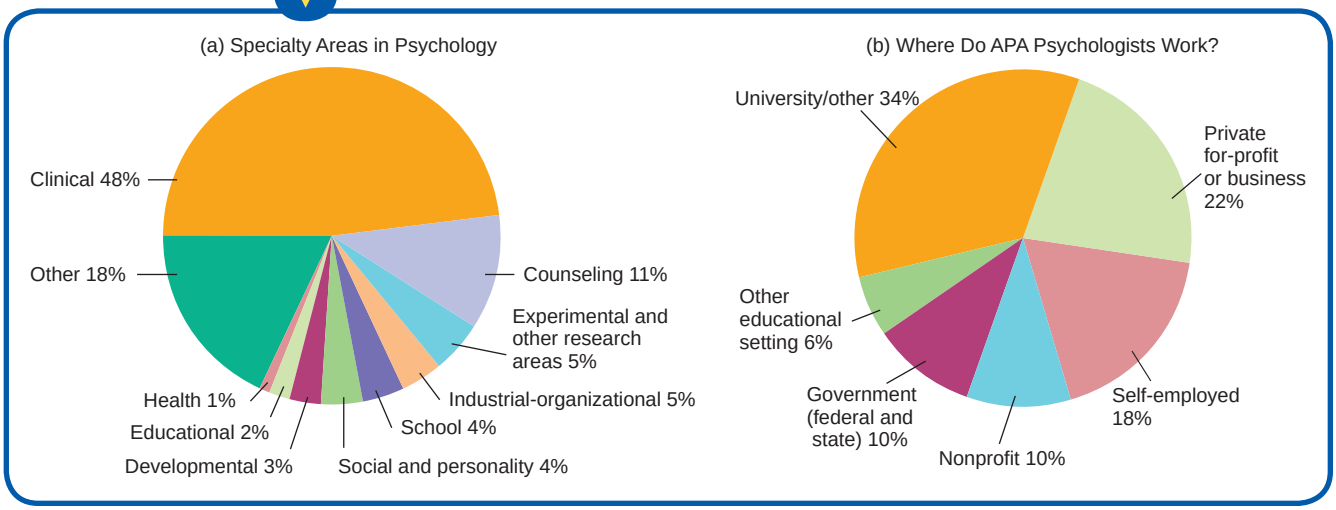
To be a *psychologist,* however, you will need a graduate degree beyond a bachelor's. Most psychology graduate students take five to seven years to earn a doctoral degree in one of psychology's subfields. The most common kind of psychologist is a *clinical psychologist* (also called a *clinician*). These psychologists use their skills as therapists, assessment specialists, and researchers to promote psychological health in groups and individuals. They may work to help someone overcome a phobia or to help make life better for someone with a psychological disorder such as schizophrenia. Clinicians often open up private practices, but they also work in medical systems, schools, counseling centers, government agencies, and mental health service organizations. Clinical psychologists must also pass tests to ensure competence (in conducting therapy) in the states where they practice.

When most people think of a psychologist, they picture a therapist in a chair with notebook in hand, and a patient or client talking about life's

Figure A.1

Psychologists at Work

These data are based on membership in the American Psychological Association (APA), which tends to have a higher percentage of clinical psychologists registered than some other psychology organizations. Nonetheless, it conveys a general idea of (a) psychologists' specialty areas and (b) the places that psychologists work (APA, 1998).



problems while reclining on a couch in the therapist's office. Contrary to popular belief, not all psychologists make a living diagnosing and treating patients for psychological problems. While clinical psychologists and *counseling psychologists* do represent the largest number of professional psychologists, psychology is made up of a number of subfields (see **Figure A.1**). Psychologists work in many different locations beyond clinical settings where therapy is conducted.

basic research Pure science that aims to increase the scientific knowledge base.

Academic Psychologists

Many of those earning a doctorate in psychology become *academic psychologists*. These psychologists work in colleges and universities conducting **basic research** in a number of subfields. To appreciate some of their interests, consider these examples of academic psychologists and the kinds of questions they might attempt to answer:

- *Neuropsychologists* (also called *biological psychologists* or *biopsychologists*) explore how the structures of the brain work to produce behaviors. Using the most advanced technology, such as magnetic resonance imaging (MRI), functional MRI (fMRI), and single-photon emission computed tomography (SPECT), neuropsychologists often study a disorder, such as bipolar disorder, attempting to diagnose, treat, and explain how this disorder disrupts normal neurological functioning. A biological psychologist might ask, "How does the brain scan of someone with bipolar disorder who is in a depressed state differ from the brain scan of the same person while in a manic state?" The answers to this and similar questions help neuropsychologists search for new and improved disorder treatments. Neuropsychologists work most often in university or college settings, where they teach classes and conduct research.
- *Social psychologists* explore how our behaviors, feelings, and beliefs are influenced by our interactions with others. Social psychologists study topics such as conformity, attitudes, leadership, prejudice, and group behavior. They provide some of the most interesting research findings you will read in any introductory psychology textbook. A social psychologist might ask, "Under what circumstances do young

Psychology: A Science and a Profession

Psychologists experiment with, observe, test, and treat behavior. Here we see psychologists testing a child, recording children's behavior, and doing face-to-face therapy.

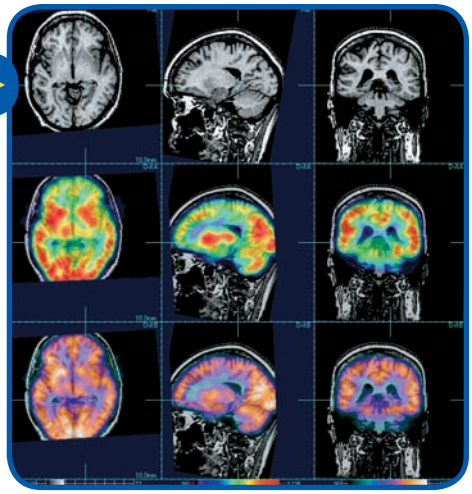
MICHAEL NEWMAN/PHOTOEDIT

JEFF GREENBERG/PHOTOEDIT

MICHAEL NEWMAN/PHOTOEDIT

Neuroimaging

Images like these help neuropsychologists study brain activity in people with disorders such as bipolar disorder. The top photos use MRI technology, the second row shows SPECT technology, and the third shows how the two are combined and recolored to demonstrate the differences between them.



COLIN STUDHOLME

adults feel compelled to light up a cigarette, even when they know it is unhealthy?" To answer this question, social psychologists might show one group of teens a video of famous people smoking at a party and then a second group of teens a video of the same celebrities at a party *not* smoking. Following the viewing of the video clips, the teens' attitudes toward smoking would be assessed. Social psychologists work in a number of settings, including businesses that conduct marketing research, consulting firms, government agencies, and universities, where they teach classes and conduct research.

- *Developmental psychologists* study the growth or development that takes place from womb to tomb. Some developmental psychologists specialize and become child psychologists, like the lead character (played by Bruce Willis) in *The Sixth Sense*. It is common for developmental psychologists to study several aspects of development (for example, growth patterns or memory skills) or to provide input on educational issues, child-care policies, or geriatric matters. A developmental psychologist might ask, "How does attending day care affect readiness for kindergarten?" To answer this question, a developmental psychologist might give a letter recognition test to 5-year-olds who attended day care and 5-year-olds who did not. Comparing the two groups to see who had more correct answers could help parents decide whether they should put their children in day care or not. The developmental psychologists who specialize in research can be found working in university settings. Other developmental psychologists might work for government agencies, day-care facilities, hospitals, or senior centers.
- *Cognitive psychologists* study thought processes in an effort to add to psychology's reservoir of knowledge. The thought processes they study include an array of topics: intelligence, anger, problem solving, attention, decision making, language, happiness, perception, memory, forgetting, and more. A cognitive psychologist might ask, "How do old memories interfere with new memories?" The work of cognitive psychologists explains why it can be difficult to remember a new password

KAREN MOSKOWITZ/GETTY IMAGES

Cognitive Psychologists

Business leaders often consult cognitive psychologists to determine the best way to operate their businesses. These psychologists explain the human factors involved in effectively running businesses.

for Facebook. You have used the old password so many times that the memory of it interferes with the way your brain accesses the new password. Most cognitive psychologists work in educational settings, but some find jobs as industrial consultants or in other business settings.

- *Experimental or research psychologists* specialize in doing research and can be specialists in any of psychology's subfields. They can ask any question pertinent to psychological science: "Do personality traits change from childhood to old age?" "How does neural activity during sleep promote learning in rats?" "Can regular exercise reduce the effects of stress?" Most experimental psychologists work in a college or university setting, but many work for government agencies or for businesses that base their production or marketing decisions on scientific research.

Psychologists Who Solve Problems

Other psychologists are more interested in **applied research**—solving specific, practical problems rather than expanding the scientific knowledge base of psychology. To appreciate this approach, consider the following examples of psychologists who lean toward the applied side and the types of questions they might attempt to answer:

- *Forensic psychologists* apply both law and psychology to legal issues. Perhaps you've seen a forensic psychologist or two on one of the many TV shows that re-create crimes. Indeed, forensic psychologists analyze crime scenes and evidence to help law officials solve crimes. However, they also use their scientific training to help solve insurance claims and custody disputes. A forensic psychologist might ask, "Is it in a child's best interest to testify in a custody case?" To answer this question, a forensic psychologist might look at past cases in

applied research Scientific study that aims to solve practical problems.

JENNIFER GRAYLOCK/GRAYLOCK.COM

Forensic Psychologists

Forensic psychologists, like the one played by B. D. Wong on *Law and Order: Special Victims Unit,* help police conduct criminal investigations.

which young children took the stand to testify and research how giving the testimony affected the children. Did the children become more withdrawn after testifying? Did they experience depression? Did their school marks suffer? Or did they seem unaffected in school and in life? You'll find forensic psychologists working in correctional facilities, law-enforcement agencies, mental health agencies, and academic settings (including law schools).

- *Sports psychologists* explore the psychological issues revolving around the improvement of athletic performance. Golfers who have trouble putting, basketball players who miss most of their free throws, and football players who suddenly cannot kick the ball between the goalposts might consider consulting a sports psychologist to help improve their concentration or focus. The sports psychologists on the U.S. Olympic team often take athletes through a "positive visualization" of their events to help prepare them for the high-stress situations they'll be in once the Olympic Games start. A sports psychologist might ask, "What kind of visual imaging should an athlete do before competing to increase the chances of success?" The sports psychologist might suggest that a golfer visualize standing over the golf ball, putter in hand, and then picture making a backswing, hitting the ball, and watching the ball go into the cup. Many sports psychologists are hired by professional sports teams, but some open private practices.
- *Educational psychologists* study how humans learn and often look for ways to improve the learning process. They study the psychological processes associated with learning, develop strategies to improve learning, and explore the relationship between learning and social or physical environment. An educational psychologist might ask, "How do we help fifth-grade students who are reading at a third-grade level catch up with their peers?" The educational psychologist might then assign and help the fifth-graders work through reading exercises that, if successfully completed, would increase the chances of reading at the proper age and grade level. The educational psychologists might also be hired to design and implement the employee-training program new hires have to complete to work for a fast-food chain like McDonald's or Subway. Employment locations include psychology departments in university settings, school systems, and government agencies.
- *Human factors psychologists* explore how people and machines interact at home and in the workplace to minimize frustration and maximize safety and productivity. For instance, a human factors psychologist might examine computer software and then make suggestions about how to make the software programs simpler to learn, install, or run. Human factors psychologists also study workplace *ergonomics,* which aims to reduce discomfort and fatigue while maximizing productivity. A human factors psychologist might ask, "How should computer keyboards be positioned to keep hands and fingers from getting tired after prolonged use?" These psychologists work in the business world and are often hired by government and military agencies.

SCOTT HALLERAN/GETTY IMAGES

LEWIS J. MERRIM/PHOTO RESEARCHERS, INC.

Psychologists Apply Research

The sports psychologist and the school psychologist in these pictures apply knowledge learned from basic research to do their jobs.

- *Industrial-organizational (I/O) psychologists* use psychological concepts to help entire businesses and organizations operate better and more efficiently. An I/O psychologist might help hire the right people for a given job, suggest ways to promote job satisfaction, or study consumer behavior so that businesses can make decisions about the products they want to sell. An I/O psychologist might ask, "What's the best way to change the overall work environment to maximize productivity?" For instance, the work of I/O psychologists has suggested that multitasking actually decreases workplace productivity (Gogan, 2005). You will find I/O psychologists in government, industry, business, and academic settings, although some run their own consulting firms.
- *School psychologists* work to improve the development of children in an elementary, a middle, or a high school setting. Most often, they are involved in the testing or assessment of children in educational settings. After analyzing testing results, a school psychologist meets with parents, educators, and specialists to develop an appropriate intervention if necessary. Helping children deal with the emotional, social, and cognitive problems they experience at school or at home is common practice for school psychologists. A school psychologist might ask, "What kind of an individual educational plan does this student need to maximize potential learning?" To help develop this plan, the school psychologist would look at the results of the data gathered on a student—perhaps a third-grader having difficulty with math—and set up the mentoring sessions that would help the child learn how to multiply and divide. You will find school psychologists in child guidance centers; public or private elementary, middle, or high school systems; and in federal or government agencies.
- *Consumer psychologists* use research to help figure out why some people buy a product and others do not. They want to know what influences consumer responses. The goal is to be able to describe and predict consumer practices, beliefs, and emotions. A consumer psychologist might ask, "What kind of a slogan or advertisement will help sell this new iPod?" The consumer psychologist would conduct tests to see whether iPod ads featuring the rock band U2 were more likely to grab attention than iPod ads featuring The Wiggles, an Australian band

MIKE FLOKIS/HEADPRESS/RETNA

ROBIN SELLICK/HEADPRESS/RETNA

Which Band?

Would you be more likely to watch an advertisement featuring U2 or The Wiggles? The answer most likely depends on your age.

that performs for young children. Consumer psychologists, like many psychologists, most often work in business and academic settings.

- *Rehabilitation psychologists* help those who have suffered an accident or illness that has resulted in the loss of optimal cognitive or physical skills. Head injury or stroke victims often require the assistance of rehabilitation psychologists to relearn language or the motor activity involved in tasks like eating or drinking. A rehabilitation psychologist might ask, "What part of the brain has been injured?" to predict the relearning that will likely be necessary. For instance, knowing that the injured part of the stroke victim's brain was responsible for communication, the rehabilitation psychologist would create a recovery program in which the stroke patient would practice basic speaking skills. Rehabilitation psychologists most often work in medical rehabilitation settings.
- *Health psychologists* research ways to prevent disease and promote health. These psychologists are likely to design and evaluate programs to help people lose weight, stop smoking, or improve sleep. Health psychologists look at the factors that lead to health problems and suggest the interventions necessary to make life better. Another common health psychologist practice is meeting with government officials to advocate and develop public health policy. A health psychologist might ask, "What are the benefits of banning smoking from public places like restaurants and bars?" Health psychologists are employed at hospitals, public health agencies, rehabilitation centers, and universities. If a health psychologist has clinical training, working in a private practice is also likely.
- *Social workers* are individuals with an undergraduate or master's degree in psychology or social work who want to improve the lives of others. Usually, social workers are not psychologists. (That is, they do not have doctoral degrees.) Social workers may help resolve family problems, work to find adequate housing for those who need it, or assist those facing disability, substance abuse, or unemployment. A social worker might ask, "How does improving the home environment help a person function best?" Perhaps the answer to that question begins with trying to make sure the family regularly eats dinner

Table A.2

Selected APA Divisions by Number and Name

1. Society for General Psychology
2. Society for the Teaching of Psychology
3. Experimental Psychology
5. Evaluation, Measurement, and Statistics
6. Behavioral Neuroscience and Comparative Psychology
7. Developmental Psychology
8. Society for Personality and Social Psychology
12. Society of Clinical Psychology
14. Society for Industrial and Organizational Psychology
15. Educational Psychology
19. Society for Military Psychology
20. Adult Development and Aging
21. Applied Experimental and Engineering Psychology
22. Rehabilitation Psychology
23. Society for Consumer Psychology
29. Psychotherapy
30. Society of Psychological Hypnosis
33. Intellectual and Developmental Disabilities
34. Population and Environmental Psychology
35. Society for the Psychology of Women
36. Psychology of Religion
38. Health Psychology
40. Clinical Neuropsychology
43. Family Psychology
45. Society for the Psychological Study of Ethnic Minority Issues
46. Media Psychology
47. Exercise and Sport Psychology
48. Society for the Study of Peace, Conflict, and Violence: Peace Psychology Division
50. Addictions

Source: American Psychological Association.

together. Social workers are most often employed by government agencies, schools, and residential care facilities.

There are many more types of psychologists working in the field. **Table A.2** lists many of the American Psychological Association's (APA's) 55 divisions, each of which may have a number of specialized subfields. Although many psychologists help people work through depression, overcome fears, or analyze character, the range of other available roles is wide.

PAUSE NOW OR MOVE ON

Turn to page A-10 to review and apply what you've learned.

SUMMARY AND FORMATIVE ASSESSMENT

APPENDIX A

Thinking About Careers in Psychology

Types of Psychologists

WHAT'S THE POINT?

A-1 What are some of the different kinds of jobs that psychologists do?

- The most common psychological career is clinical psychology. Clinical psychologists use their skills to promote psychological health in groups and individuals. Clinical psychologists work in private practices, medical systems, schools, counseling centers, government agencies, and mental health service organizations.
- Academic psychologists work in colleges and universities conducting basic research. Neuropsychologists (or biopsychologists) explore how the structures of the brain work to produce behaviors. Social psychologists explore how our behaviors and mental processes are influenced by our interactions with others. Developmental psychologists study growth or development that takes place over the life span. Cognitive psychologists study mental processes. Experimental psychologists specialize in doing research in any of psychology's subfields.
- Applied researchers work to solve specific, practical problems rather than to expand the scientific knowledge base of psychology. Forensic psychologists apply the law and psychological research methods to legal issues. Sports psychologists explore the psychological issues involved in improving athletic performance. Educational psychologists study how humans learn and look for ways to improve the learning process. Human factors psychologists explore how people and machines interact to minimize frustration and maximize safety and productivity. Industrial-organizational (I/O) psychologists use psychological concepts to help businesses and organizations operate better and more efficiently. School psychologists work to improve the development of children in school settings. Consumer psychologists use research to figure out why people buy products. Rehabilitation psychologists help those who have lost optimal cognitive or physical skills due to medical conditions. Health psychologists research ways to prevent disease and promote health. Social workers have an undergraduate or master's degree in psychology or social work and want to improve the lives of others.

Apply What You Know

1. Which of the following issues is a clinical psychologist most likely to deal with?
   a. what neurons are involved in emotional reactions
   b. a phobia about flying
   c. how children's thinking develops as they age
   d. what teaching methods are most effective
2. What is one goal all applied research psychologists share?
   a. to conduct basic research that expands the knowledge base of psychology
   b. to help people with mental illnesses
   c. to use the scientific method to diagnose and treat psychological disorders
   d. to use existing psychological research to solve specific, practical problems

KEY TERMS

basic research, p. A-3 applied research, p. A-5

APPENDIX B

Answers to Apply What You Know Questions

Module 1

Apply What You Know

1. (a)
2. (d)
3. (c)
4. (a)
5. (a)
6. (b)
7. good and pretty, segregation in schools
8. she was a woman
9. (c)
10. (d)
11. (c)
12. (a)

Module 2

Apply What You Know

1. (b)
2. Research leads to logical, supported conclusions. It is important for people to be research literate so that they can make informed decisions.
3. Confirmation
4. naturalistic
5. (a)
6. The case study method is prone to bias, and it may not be possible to extend the results of one case study to other people or situations.
7. negative
8. Variable A could cause variable B, variable B could cause variable A, or a third variable could cause variable A and variable B.
9. Be careful not to write questions that lead people to answer in a certain way.
10. random, population
11. Cross-sectional
12. Cross-sectional studies are less expensive, less difficult to conduct, and more efficient than longitudinal studies.
13. (d)
14. Because chance alone determines group assignment, we can assume individual differences among participants will be equally distributed.
15. Informed consent
16. Debriefing

Module 3

Apply What You Know

1. (c)
2. At a glance, you can see the high and low scores for each group, how the scores cluster, and what the most common scores are.
3. mean
4. skewed
5. (a)
6. range
7. (d)
8. 99.7
9. percentile rank
10. percentage
11. There is no correlation.
12. (d)
13. chance
14. (b)

Module 4

Apply What You Know

1. (a)
2. myelin
3. False
4. refractory
5. (c)
6. Neurotransmitters serve two broad functions. If they have an excitatory effect, the

receiving neuron is more likely to generate an action potential, or fire. If they have an inhibitory effect, the receiving neuron is less likely to generate an action potential.
7. sympathetic
8. somatic, autonomic
9. endocrine
10. (b)

Module 5

Apply What You Know

1. case study
2. (d)
3. (c)
4. hippocampus
5. The brain processes movement in the motor cortex and body sensations in the somatosensory cortex.
6. longitudinal fissure
7. (a)
8. Broca's/Wernicke's

Module 6

Apply What You Know

1. (a)
2. An absolute threshold is the minimum amount of stimulation needed to detect a particular stimulus, while a just noticeable difference is the minimum amount of difference needed to detect that two stimuli are not the same.
3. electromagnetic
4. (a)
5. cornea, lens
6. (d)
7. People with this condition are not blind to color but are just limited in the number of colors they can see.
8. opponent-process
9. (c)
10. cochlea
11. (b)
12. gate-control

Module 7

Apply What You Know

1. (c)
2. figure
3. *Relative size:* An object of known size appears large if it is close and small if it is far away. *Relative motion:* Perceived slowness indicates an object is distant. *Interposition:* Closer objects partially obstruct more distant objects. *Relative height:* Distant objects appear relatively higher than close objects. *Texture gradient:* Distant objects usually have a smoother texture than nearby objects. *Relative clarity:* Distant objects are less clear than nearby objects. *Linear perspective:* Parallel lines seem to draw together in the distance.
4. (b)
5. (b)
6. smaller
7. (a)
8. schema
9. Müller-Lyer
10. Ames

Module 8

Apply What You Know

1. (d)
2. (b)
3. (c)
4. circadian
5. (a)
6. True
7. True
8. (a)
9. (d)
10. (b)
11. False
12. speed up, dream
13. (c)
14. False
15. (a)
16. insomnia

Module 9

Apply What You Know

1. (b)
2. (b)
3. (c)
4. (a)
5. (d)
6. (a)
7. (d)
8. (b)
9. (a)
10. False
11. False
12. True

Module 10

Apply What You Know

1. False
2. Possible answers include pumping blood, maintaining a sense of balance, controlling the temperature of your body, listening to sounds in your environment, blinking occasionally to keep the surface of your eyes clean and moist, and digesting the remnants of your last meal.
3. False
4. (a)
5. Possible answers include flapping arms like a bird, hallucinating the smell of roses, believing it's midnight, and being angry about something that did not happen.
6. (c)
7. True
8. pain
9. Relaxation
10. False

Module 11

Apply What You Know

1. teratogen
2. (d)
3. (d)
4. (b)
5. (a)
6. False
7. (c)
8. (a)
9. (a)
10. stability and change

Module 12

Apply What You Know

1. (c)
2. True
3. Menarche
4. Primary sex characteristics in boys and girls are related to the reproductive organs—ovaries, testes, and external genitalia. Secondary sex characteristics are nonreproductive, such as breast and hip development in females and voice quality and facial hair in males.
5. (c)
6. (a)
7. (d)
8. (b)
9. (a)
10. True

Module 13

Apply What You Know

1. (b)
2. False
3. (b)
4. deteriorating neurons
5. (d)
6. (c)
7. (a)
8. disproven

Module 14

Apply What You Know

1. behavior
2. (d)
3. unconditioned stimulus, unconditioned response
4. conditioned stimulus, conditioned response
5. The rat could be classically conditioned to flex its paw when a tone is sounded if the tone (the CS) were repeatedly paired with the mild electric shock (the US). If the rat flexed its forepaw when the tone sounded, the shock would not occur. Eventually, the rat would learn to flex its forepaw every time the tone sounded, so flexing would become the CR.
6. (a)
7. The dogs started to drool too soon.
8. meat, tuning fork
9. (b)
10. The correct answer will indicate different responses to two stimuli.
11. (b)
12. Watson thought that psychology should study only observable behavior (not mental processes) and that phobias simply result from a stimulus-response relationship (and do not represent a repressed, unconscious conflict).
13. (c)
14. taste aversion

Module 15

Apply What You Know

1. consequence
2. (a)
3. Punishment

4. Reinforcement
5. Positive reinforcement occurs when behavior is followed by a desirable event or state. Negative reinforcement occurs when behavior ends an undesirable event or state.
6. (d)
7. decreases
8. Possible answers include the following: punishment like spanking does not end the desire to engage in a behavior, spanking can lead to fear and anxiety, children may imitate aggressive forms of punishment, and punishment like spanking may lead to avoidance behaviors.
9. You would break the behavior of playing catch into a succession of small steps, praising the child's first attempts every time. Gradually, you would wait for the child to complete more of the steps before giving praise, until eventually the child is able to play catch.
10. discrimination
11. (c)
12. (c)
13. overjustification
14. (a)

Module 16

Apply What You Know

1. (b)
2. Mirror
3. The response must include reference to antisocial behavior and how it was modeled.
4. The response must include reference to prosocial behavior and how it was modeled.
5. (d)
6. The response should include these points: higher levels of viewing violence are associated with increased acceptance of aggressive attitudes and increased aggressive behavior; exposure especially at young ages can have harmful, lifelong consequences; portrayal of women and ethnic minorities in violent scenarios worsens violence actually experienced by these groups; and TV programming and commercials affect our concept of reality.

Module 17

Apply What You Know

1. (d)
2. True
3. Skinner
4. (a)
5. (b)
6. False

Module 18

Apply What You Know

1. (a)
2. fundamental attribution error
3. (c)
4. True
5. (b)
6. (b)
7. social loafing
8. groupthink
9. self-fulfilling prophecy
10. minority, majority

Module 19

Apply What You Know

1. (b)
2. False
3. (c)
4. (a)
5. (d)
6. False
7. (a)
8. scapegoat theory
9. (c)
10. False
11. (c)
12. superordinate goals

Module 20

Apply What You Know

1. (d)
2. (b)
3. (c)
4. (c)
5. (a)
6. norms

Module 21

Apply What You Know

1. culture
2. resources, culture
3. (a)
4. (b)
5. (d)

6. (c)
7. (a)
8. flexible
9. amygdala
10. solve problems, explore relationships

Module 22

Apply What You Know

1. self-reference
2. True
3. (a)
4. long-term potentiation
5. When context and state are the same as they were during encoding, retrieval is easier.
6. False

Module 23

Apply What You Know

1. (b)
2. False
3. (c)
4. False
5. repression
6. (a)
7. (d)
8. True

Module 24

Apply What You Know

1. False
2. (d)
3. heuristic
4. algorithm
5. (c)
6. (a)

Module 25

Apply What You Know

1. (b)
2. analytic
3. (b)
4. (a)
5. (d)
6. True
7. True
8. (c)

Module 26

Apply What You Know

1. False
2. (a)
3. (c)
4. Yerkes-Dodson law
5. (d)
6. True
7. (a)
8. discipline or passion
9. (b)
10. (b)

Module 27

Apply What You Know

1. Schachter's two-factor theory
2. (d)
3. (c)
4. Pupils dilate, salivation decreases, skin perspires, respiration increases, heart accelerates, digestion slows, and adrenal glands secrete stress hormones.
5. False
6. display

Module 28

Apply What You Know

1. (b)
2. (c)
3. (a)
4. True
5. The theory is based on ideas that cannot be examined with the scientific method.
6. (b)
7. (a)
8. (d)
9. constructive criticism
10. positive psychology

Module 29

Apply What You Know

1. traits
2. personality
3. (a)
4. (b)
5. (a)
6. (d)

7. (c)
8. (c)
9. (a)
10. situation
11. (b)
12. external locus of control
13. (a)
14. (d)

Module 30

Apply What You Know

1. maladaptive
2. (a)
3. False
4. bio-psycho-social
5. (d)
6. True
7. False
8. (c)

Module 31

Apply What You Know

1. (a)
2. compulsion
3. (b)
4. False
5. (b)
6. social-cognitive
7. Learned helplessness
8. True

Module 32

Apply What You Know

1. (d)
2. False
3. paranoid
4. The correct answer will provide one- or two-sentence descriptions of the role of genetics, brain structure, brain function, or prenatal viruses.
5. True
6. (a)

Module 33

Apply What You Know

1. (c)
2. True
3. active listening, unconditional positive regard
4. False
5. (d)
6. (a)
7. cognitive
8. False
9. False
10. family

Module 34

Apply What You Know

1. (b)
2. True
3. False
4. False
5. (a)
6. True

Module 35

Apply What You Know

1. (d)
2. Phase 1 is an alarm reaction, Phase 2 is resistance, and Phase 3 is exhaustion.
3. False
4. (b)
5. (c)
6. (c)

Module 36

Apply What You Know

1. Wellness
2. (c)
3. flow
4. (b)
5. set point
6. (a)

Appendix A

Apply What You Know

1. (b)
2. (d)

Glossary of Key Terms and Key People

A

absolute threshold. The minimum amount of stimulation needed to detect a particular stimulus. (p. 96)

accommodation. Adapting current schemas to incorporate new information. (p. 198)

achievement motivation. A desire for significant accomplishment; for mastery of things, people, or ideas; and for attaining a high standard. (p. 470)

achievement tests. Tests that attempt to measure what the test-taker has accomplished. (p. 451)

acquisition. The process of developing a learned response. (p. 252)

action potential. A neural impulse; a brief electrical charge that travels down the axon of a neuron. (p. 64)

active listening. Empathic listening in which the listener echoes, restates, and clarifies. (p. 592)

Adler, Alfred (1870–1937). Neo-Freudian who thought social tensions were more important than sexual tensions in the development of personality. (p. 503)

adolescence. The transition period from childhood to adulthood, extending from puberty to independence. (p. 214)

aggression. Any physical or verbal behavior intended to hurt or destroy. (p. 349)

agonist. A drug that boosts the effect of a neurotransmitter. (p. 68)

algorithm. A problem-solving strategy that guarantees the solution to a problem. (p. 430)

all-or-none principle. The principle stating that if a neuron fires, then it always fires at the same intensity; all action potentials have the same strength. (p. 65)

Allport, Gordon (1897–1967). American psychologist and trait theorist who researched the idea that individual personalities are unique. (p. 515)

altruism. Unselfish regard for the welfare of others. (p. 341)

Alzheimer's disease. A progressive and irreversible brain disorder characterized by gradual deterioration of memory, reasoning, language, and, finally, physical functioning. (p. 237)

amphetamines. Drugs that stimulate neural activity, speeding up body functions. (p. 166)

amygdala [uh-MIG-duh-la]. An almond-shaped neural cluster in the limbic system that controls emotional responses, such as fear and anger. (p. 84)

anorexia nervosa. An eating disorder in which normal-weight people (usually adolescent females) have a distorted self-perception of being "fat," put themselves on self-starvation regimens, and become dangerously underweight (15 percent or more below normal). (p. 475)

antagonist. A drug that blocks the effect of a neurotransmitter. (p. 68)

antianxiety drugs. A category of medications used to treat people undergoing significant stress; they can be helpful in treating people with anxiety disorders. (p. 611)

antidepressant drugs. A category of medications used primarily to boost serotonin levels in the brain; they can be helpful in treating major depression. (p. 612)

antipsychotic drugs. A category of medications used primarily to treat schizophrenia. (p. 610)

antisocial behavior. Negative, destructive, unhelpful behavior. (p. 294)

antisocial personality disorder. A personality disorder in which the person (usually a man) shows a lack of conscience for wrongdoing and a lack of respect for the rights of others. (p. 581)

anxiety. A vague feeling of apprehension or nervousness. (p. 550)

applied research. Scientific study that aims to solve practical problems. (pp. 5, A-5)

aptitude tests. Tests that attempt to predict the test-taker's future performance. (p. 451)

Asch, Solomon (1907–1996). Social psychologist who researched the circumstances under which people conform. (p. 322)

assimilation. Interpreting new experience in terms of existing schemas. (p. 198)

attachment. The emotional tie with another person shown by seeking closeness to the caregiver and showing distress on separation. (p. 205)

attitude. The belief and feeling that predisposes someone to respond in a particular way to objects, people, and events. (p. 315)

attribution theory. The theory that we tend to explain the behavior of others as an aspect of either an internal disposition (an inner trait) or the situation. (p. 312)

auditory nerve. The nerve that carries sound information from the ears to the temporal lobes of the brain. (p. 110)

authoritarian parenting. A style of parenting marked by imposing rules and expecting obedience. (p. 208)

authoritative parenting. A style of parenting marked by making demands on the child, being responsive, setting and enforcing rules, and discussing the reasons behind the rules. (p. 208)

automatic processing. The unconscious and effortless process of encoding information such as space, time, and frequency. (p. 391)

autonomic [aw-tuh-NAHM-ik] nervous system. The division of the peripheral nervous system that controls the glands and muscles of the internal organs; its subdivisions are the sympathetic (arousing) division and the parasympathetic (calming) division. (pp. 71, 486)

availability heuristic. Estimating the likelihood of events based on their availability in memory. (p. 435)

aversive conditioning. A type of counterconditioning that associates an unpleasant state (such as nausea) with an unwanted behavior (such as drinking alcohol). (p. 597)

axon. The extension of a neuron through which neural impulses are sent. (p. 63)

axon terminal. The end point of a neuron where neurotransmitters are stored. (p. 63)

B

Bandura, Albert (1925–). Canadian-American psychologist who is a major figure in the study of observational learning. He developed the social-cognitive perspective and believed that to understand personality one must consider the situation and the person's thoughts before, during, and after an event. (pp. 290, 521)

Bartoshuk, Linda (1938–). Renowned researcher on the role of genetics and the treatment of disorders in the chemical senses of taste and smell. (p. 112)

basal metabolic rate. The body's resting rate at which we burn calories for energy. (p. 473)

basic research. Pure science that aims to increase the scientific knowledge base. (pp. 5, A-3)

behavior genetics. The school of thought that focuses on how much our genes and our environment influence our individual differences. (pp. 16, 357)

behavior therapy. Therapy that applies learning principles to the elimination of unwanted behaviors. (p. 594)

behaviorism. The theory that psychology should only study observable behaviors, not mental processes. (pp. 10, 257)

Binet, Alfred (1857–1911). Developer of the first test to classify children's abilities using the concept of mental age. (p. 443)

binocular cues. Depth cues that require the use of both eyes. (p. 122)

biological perspective. School of thought that focuses on the physical structures and substances underlying a particular behavior, thought, or emotion. (p. 15)

biological rhythms. Periodic physiological fluctuations. (p. 140)

biomedical therapy. The treatment of psychological disorders by changing the brain's functioning with prescribed drugs, electroconvulsive therapy, or surgery. (p. 607)

bio-psycho-social model. A contemporary perspective that assumes biological, psychological, and social factors combine and interact to produce psychological disorders. (p. 538)

bipolar disorder. A mood disorder (formerly called *manic depressive disorder*) in which the person alternates between the hopelessness of depression and the overexcited and unreasonably optimistic state of mania. (p. 561)

blind spot. The point at which the optic nerve travels through the retina to exit the eye; the lack of rods and cones at this point creates a small blind spot. (p. 104)

body mass index (BMI). An individual's weight in kilograms (pounds multiplied by 0.45) divided by squared height in meters (inches divided by 39.4). American government guidelines encourage a BMI under 25. The World Health Organization and many countries define obesity as a BMI of 30 or higher. (p. 648)

bottom-up processing. Information processing that analyzes the raw stimuli entering through the many sensory systems. (p. 95)

brainstem. The oldest part and central core of the brain; it begins where the spinal cord swells as it enters the skull and is responsible for automatic survival functions. (p. 81)

Broca's area. A brain area of the left frontal lobe that directs the muscle movements involved in speech. (p. 89)

bulimia nervosa. An eating disorder characterized by episodes of overeating—usually of high-calorie foods—followed by vomiting, use of laxatives, fasting, or excessive exercise. (p. 475)

bystander effect. The tendency for a person to be less likely to give aid if other people are present. (p. 342)

C

caffeine. Stimulant found in coffee, chocolate, tea, and some soft drinks. (p. 164)

Cannon, Walter (1871–1945). American physiologist who, with Philip Bard, concluded that physiological arousal and emotional experience occur simultaneously (see *Cannon-Bard theory*). (pp. 481, 623)

Cannon-Bard theory. The theory that an emotion-arousing stimulus simultaneously triggers physiological responses and the subjective experience of emotion. (p. 482)

case study. A research technique in which one person is studied in depth in the hope of revealing universal principles. (pp. 25, 79)

Cattell, Raymond [kuh-TELL] (1905–1998). English psychologist who researched whether some traits predicted others; he proposed 16 key personality dimensions or factors to describe personality. (p. 515)

central nervous system (CNS). The brain and the spinal cord. (p. 71)

cerebellum [sehr-uh-BELL-um]. The "little brain" attached to the rear of the brainstem; it helps coordinate voluntary movements and balance. (p. 82)

cerebral [seh-REE-bruhl] cortex. The intricate fabric of interconnected neurons that form the body's ultimate control and information-processing center. (p. 84)

Chomsky, Noam (1928–). Linguist who argues that children have a predisposition to learn language, as though their brains were hardwired to pick up vocabulary and rules of grammar. (p. 302)

chromosomes. Threadlike structures made of DNA molecules that contain genes. (p. 358)

chunking. Organizing information into meaningful units. (p. 397)

circadian [ser-KAY-dee-un] rhythms. Biological rhythms (for example, of temperature and wakefulness) that occur approximately every 24 hours. (p. 140)

Clark, Kenneth (1914–2005) and Mamie Phipps Clark (1917–1983). Researchers whose work was used in the *Brown v. Board of Education* case that overturned segregation in schools. (p. 13)

classical conditioning. A type of learning in which a stimulus gains the power to cause a response. (p. 250)

client-centered therapy. A humanistic therapy, developed by Rogers, in which the therapist uses techniques such as active listening within a genuine, accepting, empathic environment to facilitate the client's growth. (p. 592)

cocaine. Stimulant derived from the leaves of the coca plant. (p. 165)

cochlea [KOHK-lee-uh]. The major organ of hearing; a snail-shaped, bony, fluid-filled structure in the inner ear where sound waves are changed to neural impulses. (p. 109)

cognition. All mental processes associated with thinking, knowing, and remembering. (pp. 198, 261)

cognitive abilities. All mental activities associated with thinking, knowing, and remembering. (p. 427)

cognitive dissonance theory. The theory that we act to reduce the discomfort (dissonance) we feel when two of our thoughts (cognitions) are inconsistent. (p. 319)

cognitive map. The mental representation of a place. (p. 282)

cognitive perspective. School of thought that focuses on how people think—how we take in, process, store, and retrieve information. (p. 15)

cognitive therapy. Therapy that teaches people new, more adaptive ways of thinking and acting. (p. 599)

cognitive-behavioral therapy. Integrative therapy that combines changing self-defeating thinking with changing inappropriate behaviors. (p. 601)

collective unconscious. Jung's concept of a shared, inherited reservoir of memory traces from our ancestors. (p. 503)

collectivism. Giving priority to the goals of the group (often the extended family or work group) and defining personal identity accordingly. (p. 374)

companionate love. A deep affectionate attachment we feel for those with whom our lives are intertwined. (p. 340)

computerized axial tomography (CT or CAT). A series of X-ray photographs taken from different angles and combined by computer into a composite representation of a slice through the body. (p. 80)

concept. A mental grouping based on shared similarity. (p. 428)

concrete operational stage. In Piaget's theory, the stage of cognitive development (from about 6 or 7 to 11 years of age) during which children gain the mental skills that let them think logically about concrete events. (p. 202)

conditioned response (CR). The response to the conditioned stimulus. (p. 251)

conditioned stimulus (CS). A previously neutral stimulus that, through learning, gains the power to cause a response. (p. 251)

cones. Visual receptor cells located in the retina that can detect sharp details and color. (p. 104)

confirmation bias. The tendency to focus on information that supports preconceptions. (pp. 23, 435)

conformity. Adjusting behavior or thinking to coincide with a group standard. (p. 322)

confounding variable. In an experiment, a variable other than the independent variable that could produce a change in the dependent variable. (p. 32)

consciousness. Awareness of yourself and your environment. (pp. 140, 175)

conservation. The principle (which Piaget believed to be a part of concrete operational reasoning) that properties such as mass, volume, and number remain the same despite changes in the forms of objects. (p. 201)

context effect. The enhanced ability to retrieve information when you are in an environment similar to the one in which you encoded the information. (p. 407)

continuous reinforcement. In operant conditioning, a schedule of reinforcement in which a reward follows every correct response. (p. 279)

control group. The participants in an experiment who are not exposed to the independent variable. (p. 31)

convergence. A binocular depth cue related to the tension in the eye muscles when the eyes track inward to focus on objects close to the viewer. (p. 124)

cornea. The clear, curved bulge on the front of the eye that bends light rays to begin focusing them. (p. 102)

corpus callosum [KOR-pus kah-LOW-sum]. The large band of neural tissue that connects the two brain hemispheres and allows them to communicate with each other. (p. 85)

correlation coefficient. A statistical measure of the strength of the relationship between two variables. (p. 51)

correlational study. A research project strategy that investigates the degree to which two variables are related to each other. (p. 25)

critical period. The optimal period shortly after birth when an organism's exposure to certain experiences produces proper development. (p. 206)

critical thinking. Thinking that does not blindly accept arguments and conclusions. (p. 24)

cross-cultural research. Research that tests hypotheses on many groups of people to understand whether principles apply across cultures. (p. 376)

cross-sectional study. A research technique that compares individuals from different age groups at one time. (p. 28)

crystallized intelligence. Accumulated knowledge and verbal skills. (p. 239)

culture. The shared attitudes, beliefs, norms, and behaviors of a group communicated from one generation to the next. (pp. 368, 372)

culture specific. Principles that are true only for people of a certain culture. (p. 376)

D

Darley, John (1938–). Psychologist who, with Bibb Latané, researched the circumstances that determine when a bystander will intervene on behalf of another person. (p. 342)

defense mechanisms. In psychoanalytic theory, the ego's protective methods of reducing anxiety by unconsciously distorting reality. (p. 499)

deindividuation. The loss of self-awareness and self-restraint occurring in group situations that foster arousal and anonymity. (p. 328)

deinstitutionalization. The release of patients from mental hospitals into the community. (p. 608)

delusions. False beliefs that are symptoms of schizophrenia and other serious psychological disorders. (p. 574)

Dement, William (1928–). Sleep researcher who coined the term *rapid eye movement (REM).* (p. 142)

dendrite. The branching extensions of a neuron that receive information and conduct impulses toward the cell body (soma). (p. 63)

dependence. State of physiological or psychological need (or combined need) to take more of a drug after continued use. (p. 157)

dependent variable (DV). The variable that should show the effect of the independent variable. (p. 30)

depressants. Drugs (such as alcohol and sedatives) that reduce neural activity and slow body functions. (p. 159)

depth perception. The ability to see in three dimensions and to judge distance. (p. 121)

developmental psychology. A subfield of psychology that studies physical, cognitive, and social change throughout the life span. (p. 198)

difference threshold (just noticeable difference, or jnd). The minimum amount of difference needed to detect that two stimuli are not the same. (p. 97)

discrimination. In classical conditioning, the ability to distinguish between two signals or stimuli and produce different responses. (p. 256)

discrimination. In operant conditioning, the ability to distinguish between two similar signals or stimuli and produce different responses. (p. 277)

discrimination. In social relations, taking action against a group of people because of stereotyped beliefs and feelings of prejudice. (p. 344)

display rules. The cultural rules governing how and when a person may express emotion. (p. 491)

dissociative amnesia. A dissociative disorder characterized by loss of memory in reaction to a traumatic event. (p. 571)

dissociative disorders. Disorders in which the sense of self has become separated (dissociated) from previous memories, thoughts, or feelings. (p. 570)

dissociative fugue. A dissociative disorder characterized by loss of identity and travel to a new location. (p. 571)

dissociative identity disorder. A rare and controversial dissociative disorder in which an individual exhibits two or more distinct and alternating personalities. (p. 571)

divided consciousness theory. Theory that during hypnosis our consciousness splits so that one aspect of consciousness is not aware of the role other parts are playing. (p. 178)

DNA (deoxyribonucleic acid). A complex molecule containing the genetic information that makes up chromosomes. (p. 359)

double-blind procedure. A research procedure in which both the data collectors and the research participants do not know the expected outcome of the experiment. (p. 34)

drive-reduction theory. The idea that a physiological need creates a state of tension (a drive) that motivates an organism to satisfy the need. (p. 463)

DSM-IV-TR. The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition, text revision; a widely used system for classifying psychological disorders. (p. 539)

dual processing. The principle that information is often processed on separate conscious and unconscious tracks at the same time. (p. 176)

E

Ebbinghaus, Hermann (1850–1909). German philosopher who conducted pioneering memory studies. (pp. 392, 413)

eclectic approach. An approach to psychotherapy that, depending on the person's problems, uses techniques from various forms of therapy. (p. 588)

ecstasy. Also called MDMA, this hallucinogenic stimulant produces lowered inhibitions, pleasant feelings, and greater acceptance of others. (p. 166)

effortful processing. Encoding that requires attention and conscious effort. (p. 391)

ego. The largely conscious, "executive" part of personality that, according to Freud, negotiates among the demands of the id, the superego, and reality; operates on the reality principle, satisfying the id's desires in ways that will realistically bring pleasure rather than pain. (p. 499)

egocentrism. In Piaget's theory, the inability of the preoperational child to take another person's point of view or to understand that symbols can represent other objects. (p. 202)

electroconvulsive therapy (ECT). Therapy for major depression in which a brief electric current is sent through the brain of an anesthetized patient. (p. 614)

electroencephalogram (EEG). An amplified recording of the waves of electrical activity that sweep across the brain's surface; these waves, measured by electrodes placed on the scalp, are helpful in evaluating brain function. (p. 81)

electroencephalograph (EEG). Machine that amplifies and records waves of electrical activity that sweep across the brain's surface; electrodes placed on the scalp measure these waves. (p. 145)

embryo. A developing human organism from about 2 weeks after fertilization through the end of the eighth week. (p. 192)

emerging adulthood. A period from the late teens to the mid-twenties (and sometimes later), bridging the gap between adolescent dependence and full independence and responsible adulthood. (p. 233)

emotional intelligence. The ability to perceive, express, understand, and regulate emotions. (p. 442)

emotions. Whole-organism responses, involving physiological arousal, expressive behaviors, and conscious experience. (p. 480)

encoding. The process of getting information into the memory system. (pp. 390, 411)

endocrine [EN-duh-krin] system. One of the body's two communication systems; a set of glands that produce hormones, chemical messengers that circulate in the blood. (p. 73)

environment. Every nongenetic influence, from prenatal nutrition to the people and things around us. (p. 357)

equity. The condition in which people contribute to and receive from a relationship at a similar rate. (p. 340)

Erikson, Erik (1902–1994). Created an eight-stage theory of social development. (p. 222)

ethnocentrism. The tendency to view the world through your own cultural filters. (p. 379)

evolutionary psychology. School of thought that focuses on the principles of natural selection to study the roots of behavior and mental processes. (p. 17)

excitatory effect. A neurotransmitter effect that makes it more likely that the receiving neuron will generate an action potential, or "fire." (p. 66)

experiment. A research method in which the researcher manipulates and controls certain variables to observe the effect on other variables. (p. 29)

experimental group. The participants in an experiment who are exposed to the independent variable. (p. 31)

explanatory style. Habits we have for thinking about the good or bad causes of events. (p. 644)

explicit memory. The memory of facts and experiences. (p. 404)

external locus of control. The perception that chance, or forces beyond your control, determines your fate. (p. 524)

extinction. In classical conditioning, the diminishing of a learned response after repeated presentation of the conditioned stimulus alone. (p. 252)

extinction. In operant conditioning, the loss of a behavior when no consequence follows it. (p. 277)

extrasensory perception (ESP). The controversial claim that perception can occur apart from sensory input. (p. 131)

extrinsic motivation. A desire to perform a behavior because of promised rewards or threats of punishment. (p. 466)

Eysenck, Hans [EYE-zink] (1916–1997). German psychologist who researched the genetically influenced dimensions of personality, including extraversion and introversion. (p. 516)

F

family therapy. Therapy that views an individual's unwanted behaviors as influenced by or directed at other members of the family and attempts to guide the family toward positive relationships and improved communication. (p. 603)

fetal alcohol syndrome (FAS). Physical and cognitive abnormalities that appear in children whose mothers consumed large amounts of alcohol while pregnant. (p. 194)

fetus. A developing human organism from 9 weeks after conception to birth. (p. 193)

figure-ground. The organization of the visual field into objects (figures) that stand out from their surroundings (ground). (p. 120)

fixation. A mental set that hinders the solution of a problem. (p. 432)

fixed-interval schedule. In operant conditioning, a partial reinforcement schedule that rewards only the first correct response after some defined period. (p. 279)

fixed-ratio schedule. In operant conditioning, a partial reinforcement schedule that rewards a response only after some defined number of correct responses. (p. 281)

flashbulb memory. A vivid, clear memory of an emotionally significant moment or event. (p. 403)

flow. A state of optimal experience that involves a challenge, requires skill, has clear goals, and provides feedback. (p. 642)

fluid intelligence. The ability to reason speedily and abstractly. (p. 239)

foot-in-the-door phenomenon. The tendency for people who have first agreed to a small request to comply later with a larger request. (p. 317)

formal operational stage. In Piaget's theory, the stage of cognitive development (beginning about age 12) during which people begin to think logically about abstract concepts and form strategies about things they may not have experienced. (p. 203)

framing. How an issue is worded or presented, which can influence decisions and judgments. (p. 437)

fraternal twins. Twins who develop from two different fertilized eggs; they are genetically no more similar than any other two siblings, but they share a fetal environment. (p. 361)

free association. A method of exploring the unconscious in which the person relaxes and says whatever comes to mind, no matter how trivial or embarrassing. (p. 497)

frequency distribution. A list of scores ordered from highest to lowest. (p. 43)

Freud, Sigmund (1856–1939). Founder of psychoanalysis, a controversial theory about the workings of the unconscious mind. (pp. 9, 417, 496, 587)

frontal lobes. The portion of the cerebral cortex lying just behind the forehead that is involved in planning and judgment; it includes the motor cortex. (p. 85)

functional fixedness. The tendency to think of things only in terms of their usual functions. (p. 432)

functionalism. Theory that emphasized the functions of consciousness or the ways consciousness helps people adapt to their environment. (p. 8)

fundamental attribution error. The tendency to attribute the behavior of others to internal dispositions rather than to situations. (p. 312)

G

Gardner, Howard (1943–). Author of a contemporary theory of multiple intelligences consisting of eight separate kinds of intelligence. (p. 440)

gender. Our definition of male and female, based on socially and culturally influenced characteristics, as well as biology. (p. 381)

gender identity. Our sense of being male or female. (p. 382)

gender role. A set of expected behaviors for males or for females. (p. 382)

general adaptation syndrome (GAS). Selye's concept of the body's adaptive response to stress in three phases—alarm, resistance, and exhaustion. (p. 624)

general intelligence *(g)*. The factor that Charles Spearman believed underlies all multiple intelligences. (p. 443)

generalization. Producing the same response to two similar stimuli. (p. 255)

generalized anxiety disorder. An anxiety disorder characterized by disruptive levels of persistent, unexplained feelings of apprehension and tenseness. (p. 551)

genes. The biochemical units of heredity that make up chromosomes. (pp. 192, 357)

gestalt. The "whole," or the organizational patterns that we tend to perceive; the Gestalt psychologists emphasized that the whole is greater than the sum of its parts. (p. 119)

Gestalt [gih-SHTALT] psychology. Psychological perspective that emphasized our tendency to integrate pieces of information into meaningful wholes. (p. 7)

grammar. The system of rules governing how we can combine phonemes, morphemes, and words to produce meaningful communication. (p. 300)

group polarization. Enhancement of a group's already-existing attitudes through discussion within the group. (p. 329)

grouping. The perceptual tendency to organize stimuli into understandable units. (p. 120)

groupthink. The mode of thinking that occurs when the desire for harmony in a decision-making group overrides a realistic appraisal of the alternatives. (p. 330)

H

hair cells. The receptor cells for hearing; these are located in the cochlea and are responsible for changing sound vibrations into neural impulses. (p. 109)

hallucinations. False perceptions that are symptoms of schizophrenia and other serious psychological disorders. (p. 575)

hallucinogens. Psychedelic (mind-manifesting) drugs, such as LSD, that distort perceptions and evoke sensory images in the absence of sensory input. (p. 167)

health psychology. A subfield of psychology that focuses on how stress affects well-being and health. (p. 622)

heritability. The degree to which traits are inherited. (p. 361)

heuristic. A rule-of-thumb problem-solving strategy that makes finding a solution more likely and efficient but does not guarantee a solution. (p. 431)

hierarchy of needs. Maslow's pyramid of human needs, beginning at the base with physiological needs that must be satisfied before higher-level safety needs and then psychological needs become active. (p. 468)

Hilgard, Ernest (1904–2001). Pioneering hypnosis researcher and an advocate of the divided consciousness theory of hypnosis. (p. 178)

hippocampus. A neural center located in the limbic system that wraps around the back of the thalamus; it helps process new memories for permanent storage. (p. 84)

homeostasis. A tendency to maintain a balanced or constant internal state. (p. 465)

hormone. A chemical messenger produced by the endocrine glands and circulated in the blood. (p. 73)

Horney, Karen [HORN-eye] (1885–1952). Neo-Freudian who found psychoanalysis negatively biased toward women and believed cultural variables are the foundation of personality development. (p. 503)

humanistic psychology. A perspective that focuses on the study of conscious experience, the individual's freedom to choose, and the individual's capacity for personal growth. (pp. 10, 506)

hypnosis. Social interaction in which a hypnotist makes suggestions about perceptions, feelings, thoughts, or behaviors and those suggestions are followed. (p. 177)

hypochondriasis. A somatoform disorder characterized by imagined symptoms of illness. (p. 573)

hypothalamus [hi-po-THAL-uh-muss]. A neural structure lying below the thalamus; it helps regulate many of the body's maintenance activities, such as eating, drinking, and body temperature, and is linked to emotion. (p. 84)

hypothesis. A testable prediction about the outcome of research. (p. 29)

I

id. The part of personality that, according to Freud, consists of unconscious, psychic energy and strives to satisfy basic sexual and aggressive drives; operates on the pleasure principle, demanding immediate gratification. (p. 499)

identical twins. Twins who develop from a single fertilized egg that splits in two, creating two genetically identical organisms. (p. 361)

identity. One's sense of self; according to Erikson, the adolescent's task is to solidify a sense of self by testing and integrating various roles. (p. 223)

implicit memory. The memory of skills and procedures. (p. 404)

imprinting. The process by which certain animals form attachments during a critical period early in life. (p. 206)

independent variable (IV). The variable that the researcher will actively manipulate and, if the hypothesis is correct, that will cause a change in the dependent variable. (p. 30)

individualism. Giving priority to personal goals over group goals and defining identity in terms of personal attributes rather than group identification. (p. 374)

inferential statistics. Statistics that can be used to make a decision or reach a conclusion about data. (p. 53)

inferiority complex. According to Adler, a condition that comes from being unable to compensate for normal inferiority feelings. (p. 503)

infradian [in-FRAY-dee-un] rhythms. Biological rhythms that occur once a month or once a season. (p. 141)

ingroup. "Us"—people with whom we share a common identity. (p. 346)

ingroup bias. The tendency to favor our own group. (p. 346)

inhibitory effect. A neurotransmitter effect that makes it less likely that a receiving neuron will generate an action potential, or "fire." (p. 66)

insight. The sudden realization (Aha!) of the solution to a problem. (p. 431)

insomnia. Recurring problems in falling asleep or staying asleep. (p. 151)

instinct. A complex, inherited behavior that is rigidly patterned throughout a species. (p. 462)

intelligence. The ability to learn from experience, solve problems, and use knowledge to adapt to new situations. (p. 440)

intelligence quotient (IQ). The number that results from dividing mental age by chronological age and multiplying by 100. (p. 445)

internal locus of control. The perception that you control your own fate. (p. 524)

interneurons. Nerve cells in the brain and spinal cord responsible for processing information. (p. 67)

interpretation. In psychoanalysis, the analyst's noting of ideas on the meaning behind dreams, resistances, and other significant behaviors to promote insight. (p. 589)

intimacy. In Erikson's theory, the ability to form close, loving, open relationships; a primary task in early adulthood. (p. 225)

intrinsic motivation. A desire to perform a behavior for its own sake and to be effective. (p. 466)

iris. A ring of muscle tissue that forms the colored portion of the eye and regulates the size of the pupil. (p. 102)

J

James, William (1842–1910). First American psychologist and author of the first psychology textbook. He believed our awareness of physiological responses leads to our experience of emotion (see *James-Lange theory*). (pp. 8, 481)

James-Lange theory. The theory that we experience emotion because we are aware of our bodily response to an emotion-arousing stimulus. (p. 481)

Jung, Carl [YOO-ng] (1875–1961). Neo-Freudian who believed that humans share a collective unconscious. (p. 503)

just-world phenomenon. The tendency to believe that people get what they deserve and deserve what they get. (p. 348)

K

Kahneman, Daniel (1934–). Psychologist who, along with Amos Tversky, conducted research to discover factors that influence human judgment and decision making. He won the Nobel Prize in 2002 for this work. (p. 435)

kinesthetic sense. The system for sensing the position and movement of individual body parts. (p. 114)

Kohlberg, Lawrence (1927–1987). Created a three-stage theory of moral development. (p. 219)

L

Lange, Carl (1834–1900). Danish physiologist who proposed a theory of emotion similar to, and at about the same time as, James's theory that awareness of physiological responses leads to experiences of emotion (see *James-Lange theory*). (p. 481)

language. Our spoken, written, or gestured words and the ways we combine them to communicate meaning. (p. 298)

Latané, Bibb (1937–). Psychologist who, with John Darley, researched the circumstances that determine when a bystander will intervene on behalf of another person. (p. 342)

latent learning. Learning that occurs but is not apparent until the learner has an incentive to demonstrate it. (p. 282)

Lazarus, Richard (1922–2002). American psychologist who concluded that some emotional responses do not require conscious thought but still involve some kind of unconscious cognitive appraisal. (p. 484)

learned helplessness. The hopeless feeling when an animal or human can't avoid repeated bad events. (p. 525)

learning. A relatively permanent change in behavior caused by experience. (p. 250)

lens. A transparent structure behind the pupil in the eye that changes shape to focus images on the retina. (p. 102)

limbic system. A ring of structures at the border of the brainstem and cerebral cortex; it helps regulate important functions such as memory, fear, aggression, hunger, and thirst, and it includes the hypothalamus, the hippocampus, and the amygdala. (p. 83)

lobotomy. A now-rare form of psychosurgery once used to try to calm uncontrollably emotional or violent patients; the procedure cut the nerves that connect the frontal lobes of the brain to the deeper emotional centers. (p. 616)

locus of control. People's perception of the source of control over fate or what happens in life: People with an internal locus of control believe they control their fate through their behavior; people with an external locus of control believe their fate is controlled by external circumstances. (p. 378)

Loftus, Elizabeth (1944–). Psychologist at University of California, Irvine, whose research established the constructed nature of memory. (p. 418)

longitudinal fissure. The long crevice that divides the cerebral cortex into the left and right hemispheres. (p. 85)

longitudinal study. A research technique that follows the same group of individuals over a long period. (p. 28)

long-term memory. The relatively permanent and limitless storehouse of the memory system. (p. 401)

long-term potentiation. An increase in a synapse's firing efficiency that occurs when the sequence of neurons that represents a particular memory fires repeatedly; believed to be the neural basis of learning and memory. (p. 403)

Lorenz, Konrad (1903–1989). Researcher who focused on critical attachment periods in baby birds, a concept he called imprinting. (p. 206)

LSD (lysergic acid diethylamide). Powerful hallucinogenic drug; also known as acid. (p. 167)

M

magnetic resonance imaging (MRI). A technique that uses magnetic fields and radio waves to produce computer-generated images that distinguish among types of soft tissue; this allows us to see structures within the brain. (p. 80)

major depressive disorder. A mood disorder in which a person, for no apparent reason, experiences at least two weeks of depressed moods, diminished interest in activities, and other symptoms, such as feelings of worthlessness. (p. 560)

marijuana. Leaves, stems, resin, and flowers from the hemp plant that, when smoked, lower inhibitions and produce feelings of relaxation and mild euphoria. (p. 168)

Maslow, Abraham (1908–1970). Humanistic psychologist who proposed the hierarchy of needs, with self-actualization as one of the ultimate psychological needs. (pp. 468, 507)

Matsumoto, David (1959–). Psychologist and cross-cultural psychology expert. (p. 372)

maturation. Biological growth processes that enable orderly changes in behavior. (p. 195)

mean. The mathematical average of a distribution, obtained by adding the scores and then dividing by the number of scores. (p. 45)

median. The middle score in a ranked distribution; half the scores are above it, and half are below it. (p. 45)

medical model. The concept that mental diseases have physical causes that can be diagnosed, treated, and in most cases, cured. (p. 537)

medulla [muh-DUL-uh]. Located at the base of the brainstem, it controls basic life-support functions like heartbeat and breathing. (p. 82)

melatonin. Hormone that helps regulate daily biological rhythms. (p. 144)

menopause. When the menstrual cycle ends; also refers to the biological changes a woman experiences as her ability to reproduce declines. (p. 235)

mental age (MA). The chronological age that corresponds to the difficulty level of the questions a child can answer. (p. 444)

mental set. The tendency to approach a particular problem in a particular way. (p. 432)

mere exposure effect. The phenomenon that repeated exposure to novel stimuli increases one's liking of them. (p. 336)

Milgram, Stanley (1933–1984). Social psychologist who researched obedience to authority. (p. 325)

Minnesota Multiphasic Personality Inventory (MMPI). The most widely researched and clinically used of all personality tests; originally developed to identify emotional disorders (still considered its most appropriate use), this test is now used for many other screening purposes. (p. 519)

mirror neurons. Brain cells located in the front of the brain that activate when a person performs certain actions or when the person observes another do so. (p. 293)

misinformation effect. Incorporating misleading information into a memory of an event. (p. 419)

mnemonic [nih-MON-ik] device. A memory trick or technique. (p. 396)

mode. The most frequently occurring score or scores in a distribution. (p. 44)

model. The person observed in observational learning. (p. 290)

modeling. The process of observing and imitating a specific behavior. (p. 290)

monocular cues. Depth cues that require the use of only one eye. (p. 122)

morpheme. In language, the smallest unit that carries meaning. (p. 300)

motivation. A need or desire that energizes and directs behavior toward a goal. (p. 462)

motor cortex. A strip of brain tissue at the rear of the frontal lobes that controls voluntary movements. (p. 86)

Murray, Henry (1893–1988). Neo-Freudian who first established the concept of achievement motivation and developed important personality testing tools. (p. 470)

mutation. Random errors in gene replication that lead to a change in the individual's genetic code and are the source of all genetic diversity. (p. 360)

N

narcolepsy. Sleep disorder characterized by uncontrollable sleep attacks; the sufferer may lapse directly into REM sleep, often at inopportune times. (p. 153)

naturalistic observation. Observing and recording behavior in naturally occurring situations without manipulating or controlling the situation. (p. 24)

negative reinforcement. In operant conditioning, anything that increases the likelihood of a behavior by following it with the removal of an undesirable event or state. (p. 272)

neuron. A nerve cell; the basic building block of the nervous system. (p. 62)

neurotransmitter. A chemical messenger that travels across the synapse from one neuron to the next and influences whether a neuron will generate an action potential. (p. 65)

nicotine. Stimulant found in tobacco. (p. 164)

night terrors. Sleep-related problem characterized by high arousal and an appearance of being terrified; unlike nightmares, they occur during NREM 3 sleep, occur within two or three hours of falling asleep, and are seldom remembered. (p. 153)

normal distribution. A frequency distribution that is shaped like a symmetrical bell. (p. 48)

norms. Understood rules for accepted and expected behavior. (p. 368)

O

obedience. The tendency to comply with orders, implied or real, from someone perceived as an authority. (p. 325)

object permanence. The awareness that things continue to exist even when you cannot see or hear them. (p. 200)

observational learning. Learning by observing others. (p. 290)

obsessive-compulsive disorder (OCD). An anxiety disorder characterized by unwanted, repetitive thoughts and actions. (p. 551)

occipital [ahk-SIP-uh-tuhl] lobes. The portion of the cerebral cortex lying at the back of the head; it includes the primary visual processing areas of the brain. (p. 86)

operant conditioning. A type of learning in which the frequency of a behavior depends on the consequence that follows that behavior. (p. 267)

operational definition. An explanation of the exact procedures used to make a variable specific and measurable for research purposes. (p. 29)

opponent-process theory. A theory of color vision that says color is processed by cones organized in opponent pairs (red-green, yellow-blue, and black-white); light that stimulates one half of the pair inhibits the other half. (p. 106)

optic nerve. The nerve that carries visual information from the eye to the occipital lobes of the brain. (p. 104)

other-race effect. The tendency to recall faces of one's own race more accurately than faces of other races. (p. 347)

outgroup. "Them"—those perceived as different or apart from "us." (p. 346)

overconfidence. When confidence is greater than accuracy. (p. 436)

overjustification effect. The effect of promising a reward for doing what one already likes to do; the reward may lessen and replace the person's original, natural motivation so that the behavior stops if the reward is eliminated. (p. 283)

P

panic disorder. An anxiety disorder characterized by sudden bouts of intense, unexplained anxiety, often associated with physical symptoms like choking sensations or shortness of breath. (p. 551)

parasympathetic division. The part of the autonomic nervous system that calms the body. (p. 72)

parietal [puh-RYE-uh-tuhl] lobes. The portion of the cerebral cortex lying at the top of the head and toward the rear; it includes the somatosensory cortex and general association areas used for processing information. (p. 86)

partial reinforcement schedule. In operant conditioning, a schedule of reinforcement in which a reward follows only some correct responses. (p. 279)

participant bias. A tendency for research participants to behave in a certain way because they know they are being observed or they believe they know what the researcher wants. (p. 24)

passionate love. An aroused state of intense positive absorption in another, usually present at the beginning of a love relationship. (p. 339)

Pavlov, Ivan (1849–1936). Russian physiologist and learning theorist famous for the discovery of classical conditioning, in which learning occurs through association. (pp. 9, 253)

percentage. A comparative statistic that compares a score to a perfect score of 100 points. (p. 50)

percentile rank. A comparative statistic that compares a score to other scores in an imaginary group of 100 individuals. (p. 50)

perception. The process of organizing and interpreting incoming sensory information. (pp. 95, 118)

perceptual constancy. Perceiving the size, shape, and lightness of an object as unchanging even as the image of the object on the retina of the eye changes. (p. 128)

perceptual set. A mental predisposition to perceive something one way and not another. (p. 130)

peripheral nervous system (PNS). The sensory and motor nerves that connect the brain and the spinal cord to the rest of the body. (p. 71)

permastore memory. Long-term memories that are especially resistant to forgetting and that are likely to last a lifetime. (p. 414)

permissive parenting. A style of parenting marked by submitting to children's desires, making few demands, and using little punishment. (p. 208)

personality. An individual's characteristic pattern of thinking, feeling, and acting. (pp. 495, 513)

personality disorders. Psychological disorders characterized by rigid and lasting behavior patterns that disrupt social functioning. (p. 579)

personality inventories. Questionnaires (often with true-false or agree-disagree items) on which people respond to items designed to gauge a range of feelings and behaviors; used to assess selected personality traits. (p. 518)

phobia. An anxiety disorder characterized by disruptive, irrational fears of objects, activities, or situations. (p. 551)

phoneme. In language, the smallest distinctive sound unit. (p. 299)

Piaget, Jean [pee-ah-ZHAY] (1896–1980). Pioneer in the study of developmental psychology who introduced a stage theory of cognitive development that led to a better understanding of children's thought processes. (pp. 11, 198, 218)

Pinel, Philippe (1745–1826). French physician who worked to reform the treatment of people with mental disorders. (p. 537)

pitch. A sound's highness or lowness, which depends on the frequency of the sound wave. (p. 107)

pituitary gland. The endocrine system's "master gland" that, in conjunction with an adjacent brain area, controls the other endocrine glands. (p. 73)

placebo. An inactive substance or condition used to control for confounding variables. (pp. 34, 183)

plasticity. The brain's ability to change, especially during childhood, by reorganizing after damage or experience. (p. 88)

population. The entire group of people about whom you would like to know something. (p. 28)

positive psychology. A movement in psychology that focuses on the study of optimal human functioning and the factors that allow individuals and communities to thrive. (pp. 17, 525, 641)

positive reinforcement. In operant conditioning, anything that increases the likelihood of a behavior by following it with a desirable event or state. (p. 271)

positron emission tomography (PET) scan. A visual display of brain activity. (p. 81)

posthypnotic suggestion. Hypnotic suggestion that the person will carry out after the hypnosis session has ended. (p. 181)

post-traumatic stress disorder (PTSD). An anxiety disorder characterized by reliving a severely upsetting event in unwanted, recurring memories and dreams. (p. 551)

preconscious. According to Freud, a region of the mind holding information that is not conscious but is retrievable into conscious awareness. (p. 497)

prejudice. An unjustifiable (and usually negative) attitude toward a group and its members. (p. 344)

preoperational stage. In Piaget's theory, the stage (from about 2 to 6 or 7 years of age) during which a child learns to use language but cannot yet think logically. (p. 201)

primary reinforcement. Something that is naturally reinforcing, such as food (if you were hungry), warmth (if you were cold), and water (if you were thirsty). (p. 273)

primary sex characteristics. The reproductive organs—ovaries, testes, and external genitalia. (p. 216)

proactive interference. When an older memory disrupts the recall of a newer memory. (p. 415)

projective test. A personality test, such as the Rorschach or TAT, that provides ambiguous stimuli to trigger projection of inner thoughts and feelings. (p. 504)

prosocial behavior. Positive, constructive, helpful behavior. (p. 294)

prototype. A typical best example incorporating the major features of a concept. (p. 428)

pseudoscientific claim. Any assertion that appears scientific but is not based on science. (p. 140)

psychoactive drug. Chemical substance that alters perceptions, mood, or behavior. (p. 157)

psychoanalysis. Freud's theory of personality; also, a therapeutic technique that attempts to provide insight into thoughts and actions by exposing and interpreting the underlying unconscious motives and conflicts. (pp. 9, 496, 588)

psychodynamic perspective. A view of personality that retains some aspects of Freudian theory (such as the importance of unconscious thought processes) but is less likely to see unresolved childhood conflicts as a source of personality development. (p. 496)

psychological disorder. A harmful dysfunction in which thoughts, feelings, or behaviors are maladaptive, unjustifiable, disturbing, and atypical. (p. 534)

psychology. Scientific study of behavior and mental processes. (p. 5)

psychosexual stages. Childhood stages of development (oral, anal, phallic, latency, and genital) during which, according to Freud, the id's pleasure-seeking energies focus on different parts of the body. (p. 501)

psychotherapy. An interaction between a trained therapist and someone who is seeking to overcome psychological difficulties or achieve personal growth. (p. 588)

puberty. The period of sexual maturation, during which a person becomes capable of reproducing. (p. 216)

punishment. Any consequence that decreases the future likelihood of a behavior. (p. 269)

pupil. The adjustable opening in the center of the iris, which controls the amount of light entering the eye. (p. 102)

R

random assignment. A procedure for creating groups that allows the researcher to control for individual differences among research participants. (p. 32)

random sample. A sample that fairly represents a population because each member of the population has an equal chance of being included. (p. 28)

range. The difference between the highest and lowest scores in a distribution. (p. 47)

rapid eye movement (REM) sleep. Recurring sleep stage during which vivid dreams commonly occur. (p. 147)

recall. The type of retrieval in which you must search for information that you previously stored, as on a fill-in-the-blank test. (p. 406)

receptor cells. Specialized cells in every sensory system of the body that can turn other kinds of energy into action potentials (neural impulses) that the brain can process. (pp. 67, 103)

reciprocal determinism. The mutual influences between personality and environmental factors. (p. 522)

recognition. The type of retrieval in which you must identify items you learned earlier, as on a multiple-choice test. (p. 406)

rehearsal. The conscious repetition of information. (p. 392)

reinforcement. Any consequence that increases the future likelihood of a behavior. (p. 269)

reliability. The extent to which a test yields consistent results, regardless of who gives the test or when or where it is given. (p. 452, 519)

replicate. To repeat the essence of a research study to see whether the results can be reliably reproduced. (p. 35)

repression. In Sigmund Freud's psychoanalytic theory, the process of moving anxiety-producing memories to the unconscious mind. (p. 417)

Rescorla, Robert (1940–). Developed, along with colleague Allan Wagner, a theory that emphasized the importance of cognitive processes in classical conditioning. (p. 261)

resilience. The ability to grow and thrive in the face of challenges and to bounce back from adversity. (p. 498)

resistance. In psychoanalysis, the blocking from consciousness of anxiety-laden material. (p. 589)

response. Any behavior or action. (p. 250)

resting potential. The state of a neuron when it is at rest and capable of generating an action potential. (p. 64)

reticular formation. A nerve network in the brainstem that plays an important role in controlling wakefulness and arousal. (p. 82)

retina. The light-sensitive surface at the back of the eyeball. (p. 103)

retinal disparity. A binocular depth cue resulting from slightly different images produced by the retina of the left eye and the retina of the right eye. (p. 123)

retrieval. The process of getting information out of memory storage. (pp. 390, 411)

retroactive interference. When a more recent memory disrupts the recall of an older memory. (p. 415)

rods. Visual receptor cells located in the retina that can detect only black, white, and gray. (p. 104)

Rogers, Carl (1902–1987). Humanistic psychologist who developed client-centered therapy and stressed the importance of acceptance, genuineness, and empathy in fostering human growth. (pp. 10, 508, 592)

role. A set of expectations in a social setting that define how one ought to behave. (p. 317)

rooting reflex. A baby's tendency, when touched on the cheek, to open the mouth and search for the nipple. (p. 194)

Rorschach inkblot test. The most widely used projective test is a set of 10 inkblots designed to identify people's inner feelings by analyzing their interpretations of the blots. (p. 504)

S

scapegoat theory. The theory that prejudice offers an outlet for anger by providing someone to blame. (p. 346)

Schachter, Stanley [SHACK-ter] (1922–1997). American psychologist who, with Jerome Singer, concluded that emotion requires a cognitive label of physiological arousal (see *two-factor theory*). (p. 483)

schemas. Concepts or mental frameworks that organize and interpret information. (p. 198)

schizophrenia. A group of severe disorders characterized by disorganized and delusional thinking, disturbed perceptions, and inappropriate emotions and behaviors. (p. 574)

scientific method. A method of learning about the world through the application of critical thinking and tools such as observation, experimentation, and statistical analysis. (p. 21)

secondary reinforcement. Something that you have learned to value, like money. (p. 273)

secondary sex characteristics. Nonreproductive sexual characteristics, such as breast and hip development in females and voice quality and facial hair in males. (p. 216)

selective attention. Focusing conscious awareness on a particular stimulus to the exclusion of others. (p. 99)

self-actualization. According to Maslow, an ultimate psychological need that arises after basic physical and psychological needs are met and self-esteem is achieved; the motivation to realize our full and unique potential. (pp. 468, 507)

self-concept. All our thoughts and feelings about ourselves in answer to the question "Who am I?" (p. 508)

self-disclosure. Revealing intimate aspects of oneself to others. (p. 340)

self-fulfilling prophecy. When we believe something to be true about others (or ourselves) and we act in ways that cause this belief to come true. (p. 331)

self-serving bias. A readiness to perceive oneself favorably. (p. 314)

Seligman, Martin (1942–). American psychologist who researched helplessness early in his career before turning his interest to optimism; he has been the primary proponent of positive psychology. (p. 525, 634)

Selye, Hans [SELL-yay] (1907–1982). Canadian physiologist who researched a recurring response to stress that he called the general adaptation syndrome (GAS). (p. 624)

semantic encoding. Encoding of meaning. (p. 394)

senile dementia. Mental disintegration that accompanies alcoholism, tumor, stroke, aging, and, most often, Alzheimer's disease. (p. 237)

sensation. The process by which sensory systems (eyes, ears, and other sensory organs) and the nervous system receive stimuli from our environment. (p. 95)

sensorimotor stage. In Piaget's theory, the stage (from birth to about 2 years of age) during which infants learn about the world through their sensory impressions and motor activities. (p. 200)

sensory adaptation. Diminished sensitivity to constant and unchanging stimulation. (p. 99)

sensory memory. Brief, initial coding of sensory information in the memory system. (p. 399)

sensory nerves. Nerves that carry information from the sense receptors to the spinal cord and brain. (p. 67)

serial position effect. The tendency to recall the first and last items in a list more easily. (p. 393)

set point. The point at which an individual's "weight thermostat" is supposedly set; when the body falls below this weight, an increase in hunger and a lowered metabolic rate may act to restore the lost weight. (pp. 473, 649)

sexual orientation. Enduring sexual attraction toward people of the other gender (heterosexuality) or one's own gender (homosexuality). (p. 217)

shaping. Reinforcement of behaviors that are increasingly similar to the desired one; the operant technique used to establish new behaviors. (p. 277)

short-term/working memory. The part of your memory system that contains information you are consciously aware of before it is stored more permanently or forgotten. (p. 399)

signal detection theory. A theory that predicts how and when we detect the presence of a faint stimulus (signal) amid background stimulation (noise). (p. 98)

skewed. Distorted; not evenly distributed around the mean. (p. 46)

Skinner, B. F. (1904–1990). American behavioral psychologist who developed the fundamental principles and techniques of operant conditioning and devised ways to apply them in the real world. He argued that children learn language through associations, imitation, and reinforcement. (pp. 10, 268, 302)

sleep apnea. Sleep disorder characterized by temporary cessations of breathing during sleep and consequent momentary reawakenings. (p. 151)

social clock. The culturally preferred timing of social events such as marriage, parenthood, and retirement. (p. 232)

social facilitation. Improved performance on tasks in the presence of others. (p. 327)

social influence theory. Theory that powerful social influences can produce a state of hypnosis. (p. 178)

social loafing. The tendency for people in a group to exert less effort when pooling their efforts toward attaining a common goal than when individually accountable. (p. 328)

social psychology. The scientific study of how we think about, influence, and relate to one another. (p. 311)

social-cognitive perspective. A perspective stating that understanding personality involves considering how people are affected by a particular situation, by what they have learned, by how they think, and by how they interact socially. (p. 513)

social-cultural perspective. School of thought that focuses on how thinking or behavior changes in different situations or as a result of cultural influences. (p. 15)

somatic nervous system. The division of the peripheral nervous system that controls the body's skeletal muscles. (p. 71)

somatoform disorders. Psychological disorders in which the symptoms take a bodily form without apparent physical cause. (p. 573)

somatosensory cortex. A strip of brain tissue at the front of the parietal lobes that registers and processes body sensations. (p. 87)

somnambulism. Sleepwalking, which usually starts in the deeper stages of NREM sleep; the sleepwalker can walk and talk and is able to see but rarely has any memory of the event. (p. 153)

standard deviation. A computed measure of how much scores vary around the mean score of a distribution. (p. 47)

state-dependent memory. The enhanced ability to retrieve information when you are in the same physical and emotional state you were in when you encoded the information. (p. 408)

statistical significance. A statistical statement of how likely it is that a result occurred by chance alone. (p. 53)

stereotype. A generalized (sometimes accurate but often overgeneralized) belief about a group of people. (p. 344)

Sternberg, Robert (1949–). Author of a contemporary theory of multiple intelligences consisting of analytical, creative, and practical intelligence. (p. 441)

stimulants. Drugs (such as caffeine, nicotine, and the more powerful amphetamines and cocaine) that excite neural activity and speed up body functions. (p. 163)

stimulus. Anything in the environment that one can respond to. (p. 250)

storage. The retention of encoded information in memory over time. (pp. 390, 411)

stranger anxiety. The fear of strangers that infants commonly display, beginning by about 8 months of age. (p. 204)

stress. The process by which we perceive and respond to certain events, called stressors, that we appraise as threatening or challenging. (p. 622)

structuralism. Theory that the structure of conscious experience could be understood by analyzing the basic elements of thoughts and sensations. (p. 7)

superego. The part of personality that, according to Freud, represents internalized ideals and provides standards for judgment (the conscience) and for future aspirations. (p. 499)

superordinate goals. Shared goals that override differences among people and require their cooperation. (p. 352)

survey method. A research technique that questions a sample of people to collect information about their attitudes or behaviors. (p. 27)

sympathetic division. The part of the autonomic nervous system that arouses the body to deal with perceived threats. (p. 72)

synapse [SIN-aps]. The tiny, fluid-filled gap between the axon terminal of one neuron and the dendrite of another. (p. 65)

systematic desensitization. A type of counterconditioning that associates a pleasant, relaxed state with gradually increasing, anxiety-triggering stimuli. (p. 595)

T

temperament. A person's characteristic emotional excitability. (p. 195)

temporal lobes. The portion of the cerebral cortex lying roughly above the ears; it includes the auditory (hearing) areas of the brain. (p. 86)

teratogens. Substances that cross the placental barrier and prevent the fetus from developing normally. (p. 193)

Terman, Lewis (1877–1956). Adapted Binet's tests for use in the United States as an intelligence test that reported intelligence as a calculated IQ score. (p. 444)

thalamus [THAL-uh-muss]. The brain's sensory switchboard, located on top of the brainstem; it directs messages to the sensory receiving areas in the cortex. (p. 82)

Thematic Apperception Test (TAT). A projective test in which people express their inner feelings and interests through the stories they make up about ambiguous scenes. (p. 504)

Thorndike, Edward (1874–1949). Author of the law of effect, the principle that forms the basis of operant conditioning. (p. 268)

Titchener, Edward B. (1867–1927). Founder of structuralism. (p. 7)

token economy. An operant conditioning procedure that attempts to modify behavior by rewarding desired behaviors with some small item. (p. 598)

tolerance. Reduced responsiveness to a drug, prompting the user to take larger doses to achieve the same pleasurable effects previously obtained by smaller doses. (p. 158)

top-down processing. Information processing that draws on expectations and experiences to interpret incoming sensory information. (p. 96)

traits. Aspects of personality that are relatively consistent. (p. 513)

transference. In psychoanalysis, the patient's transfer of strong emotions (such as love or hatred) linked with other relationships to the analyst. (p. 589)

trichromatic theory. A theory of color vision that says cones are sensitive to red, green, or blue light—the three colors that combine to create millions of color combinations. (p. 105)

two-factor theory. The theory that to experience emotion we must be physically aroused and must cognitively label the arousal. (p. 483)

Type A. A term for competitive, hard-driving, impatient, verbally aggressive, and anger-prone people. (p. 630)

Type B. A term for easygoing, relaxed people. (p. 630)

U

ultradian [ul-TRAY-dee-un] rhythms. Biological rhythms that occur more than once each day. (p. 141)

unconditional positive regard. According to Rogers, an attitude of total acceptance toward another person. (p. 508)

unconditioned response (UR). An automatic response to the unconditioned stimulus. (p. 251)

unconditioned stimulus (US). A stimulus that triggers a response reflexively and automatically. (p. 251)

unconscious. According to Freud, a region of the mind that is a reservoir of mostly unacceptable thoughts, wishes, feelings, and memories. (p. 497)

V

validity. The extent to which a test measures or predicts what it is supposed to test. (pp. 452, 519)

variable-interval schedule. In operant conditioning, a partial reinforcement schedule that rewards the first correct response after an unpredictable amount of time. (p. 280)

variable-ratio schedule. In operant conditioning, a partial reinforcement schedule that rewards an unpredictable number of correct responses. (p. 281)

vestibular sense. The system for sensing body orientation and balance, which is located in the semicircular canals of the inner ear. (p. 115)

vicarious learning. Learning by seeing the consequences of another person's behavior. (p. 291)

virtual reality exposure therapy. An anxiety treatment that progressively exposes people to simulations of their greatest fears, such as airplane flying, spiders, or public speaking. (p. 596)

visual cliff. A laboratory device for testing depth perception in infants and young animals. (p. 122)

W

Watson, John B. (1878–1958). Founder of behaviorism, the theory that psychology should restrict its efforts to studying observable behaviors, not mental processes. (pp. 10, 257)

Wechsler, David (1896–1981). Developer of the most widely used individual intelligence tests in the United States, which were the first tests to report scores for both verbal and performance intelligence. (p. 446)

wellness. The common result of a healthy life-style and healthy attitudes. (p. 635)

Wernicke's [VER-nik-ees] area. A brain area of the left temporal lobe involved in language comprehension and expression. (p. 89)

withdrawal. Discomfort and distress that follow when a person who is dependent on a drug discontinues the use of that drug. (p. 158)

Wundt, Wilhelm [VOONT] (1832–1920). Founder of modern psychology; he opened the first psychology laboratory. (p. 6)

Y

Yerkes-Dodson law. The theory that a degree of psychological arousal helps performance, but only to a point. (p. 464)

Z

Zajonc, Robert [ZI-yence] (1923–2008). American psychologist who concluded that some emotional reactions involve no deliberate thinking; he believed that cognition is not always necessary for emotion. (p. 483)

Zimbardo, Philip (1933–). American psychologist whose research focuses on heroism, cult behavior, and shyness. He is most famous for the Stanford Prison Study. (p. 318)

zygote. A fertilized egg. (p. 192)

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Glosario de Términos Claves y Personas Claves

A

absolute threshold/umbral absoluto. Intensidad mínima requerida para detectar un estímulo la mitad de las veces. (pág. 96)

accommodation/acomodación. Acción de adaptar el entendimiento que se posee (esquemas) con el propósito de incorporar nueva información. (pág. 198)

achievement motivation/motivación de logro. Deseo de lograr algo importante, con respecto a cosas, personas o ideas; deseo de lograr un alto estándar. (pág. 470)

achievement tests/pruebas de rendimiento. Pruebas destinadas a medir los logros de la persona que las toma. (pág. 451)

acquisition/adquisición. Según el condicionamiento clásico, proceso mediante el cual se adquiere una respuesta aprendida. (pág. 252)

action potential/potencial de acción. Impulso nervioso; corriente eléctrica breve que pasa por el axón de una neurona. (pág. 64)

active listening/escuchar activamente. Escuchar compenetradamente, haciendo eco, repitiendo y clarificando lo que dice otra persona. Una de las características de la terapia centrada en el cliente, propuesta por Rogers. (pág. 592)

Adler, Alfred (1870–1937). Neofreudiano que sostenía que las tensiones sociales son más importantes para el desarrollo de la personalidad que las tensiones sexuales. (pág. 503)

adolescence/adolescencia. Etapa de transición de la niñez a la edad adulta, que se extiende desde la pubertad hasta la independencia del individuo. (pág. 214)

aggression/agresión. Comportamiento físico o verbal que tiene la intención de causar daño o destruir. (pág. 349)

agonist/agonista. Medicamento que aumenta el efecto de un neurotransmisor. (pág. 68)

algorithm/algoritmo. Estrategia de resolución de problemas que garantiza la solución correcta. (pág. 430)

all-or-none principle/principio de todo o nada. Principio que sostiene que si una neurona transmite un impulso, siempre lo hace con la misma intensidad; todos los potenciales de acción tienen la misma potencia. (pág. 65)

Allport, Gordon (1897–1967). Psicólogo y teórico de rasgos de la personalidad, nacido en los Estados Unidos, que realizó investigaciones basadas en la idea de que cada personalidad es única. (pág. 515)

altruism/altruismo. Consideración desinteresada por el bienestar de los demás. (pág. 341)

Alzheimer's disease/enfermedad de Alzheimer. Trastorno progresivo e irreversible del cerebro, que se caracteriza por el deterioro gradual de la memoria, el razonamiento, el lenguaje y, por último, el funcionamiento físico. (pág. 237)

amphetamines/anfetaminas. Medicamentos que estimulan la actividad nerviosa acelerando las funciones del organismo y los cambios de energía y estados de ánimo asociados con dichos cambios. (pág. 166)

amygdala [uh-MIG-duh-la]/amígdala. Conjunto de fibras nerviosas con forma de almendra que se hallan en el sistema límbico e intervienen en emociones tales como el miedo y el enojo. (pág. 84)

anorexia nervosa/anorexia nerviosa. Trastorno alimenticio en el cual las personas de peso normal (generalmente muchachas adolescentes) padecen de delirios que les hacen pensar que pesan demasiado, se someten a dietas de hambre y llegan a la delgadez extrema y peligrosa (bajando de peso un 15 por ciento o más). (pág. 475)

antagonist/antagonista. Medicamento que bloquea el efecto de un neurotransmisor. (pág. 68)

antianxiety drugs/medicamentos antiansiedad. Categoría de medicamentos que se emplean para tratar a personas que padecen de trastornos de ansiedad o estrés. (pág. 611)

antidepressant drugs/medicamentos antidepresivos. Categoría de medicamentos que se emplean principalmente para tratar la depresión grave. (pág. 612)

antipsychotic drugs/medicamentos antipsicóticos. Categoría de medicamentos que se emplean principalmente para tratar la esquizofrenia. (pág. 610)

antisocial behavior/comportamiento antisocial. Conducta negativa, destructiva y poco servicial. (pág. 294)

antisocial personality disorder/trastorno antisocial de la personalidad. Trastorno de personalidad en el cual un individuo (generalmente un hombre) no es consciente de que causa daño y no respeta los derechos de los demás. (pág. 581)

anxiety/ansiedad. Sensación vaga de aprensión o nerviosismo. Es la base de los trastornos de ansiedad. (pág. 550)

applied research/investigación aplicada. Estudio científico que tiene el propósito de resolver problemas prácticos. (págs. 5, A-5)

aptitude tests/pruebas de aptitud. Pruebas cuyo propósito es predecir el desempeño futuro de una persona. (pág. 451)

Asch, Solomon (1907–1996). Psicólogo social que estudió las circunstancias bajo las cuales las personas demuestran conformismo. (pág. 322)

assimilation/asimilación. Interpretación que realiza una persona de una experiencia nueva basándose en esquemas ya existentes. (pág. 198)

attachment/apego. Lazo afectivo con otra persona; los niños pequeños demuestran apego cuando quieren mantenerse cerca de la persona que los cría y se angustian al separarse de dicha persona. (pág. 205)

attitude/actitud. Creencia y sentimiento que predispone a un individuo a responder de una manera en particular a objetos, personas y sucesos. (pág. 315)

attribution theory/teoría de atribución. Teoría según la cual tendemos a dar una explicación casual del comportamiento de una persona, generalmente atribuyéndolo a la situación o la disposición de esa persona. (pág. 312)

auditory nerve/nervio auditivo. Nervio que transmite la información sonora de los oídos al lóbulo temporal del cerebro. (pág. 110)

authoritarian parenting/crianza autoritaria. Estilo de crianza en el que se imponen reglas y se exige obediencia. (pág. 208)

authoritative parenting/crianza disciplinada. Estilo de crianza en el cual los padres exigen cosas al niño, son receptivos, imponen reglas y las hacen cumplir conversando con el niño acerca de las razones por las que imponen dichas reglas. (pág. 208)

automatic processing/procesamiento automático. Codificación inconsciente de cierta información, tal como el espacio, el tiempo y la frecuencia, que se lleva a cabo sin esfuerzo. (pág. 391)

autonomic [aw-tuh-NAHM-ik] nervous system/sistema nervioso autónomo. División del sistema nervioso periférico que controla las glándulas y los músculos de los órganos (tales como el corazón). Sus subdivisiones son la división simpática (estimulación) y la división parasimpática (relajación). (págs. 71, 486)

availability heuristic/heurística de la disponibilidad. Estimación de la probabilidad de que ocurra un suceso, que se basa en la disponibilidad de dicho suceso en la memoria. A veces tenemos razón y a veces no, al suponer que los sucesos disponibles en la memoria son probables. (pág. 435)

aversive conditioning/condicionamiento aversivo. Tipo de condicionamiento en el que se asocia un estado desagradable (tal como las náuseas) con un comportamiento inapropiado (tal como la ingestión de alcohol). (pág. 597)

axon/axón. Prolongación de una neurona por la que se transmiten los impulsos nerviosos. (pág. 63)

axon terminal/terminal del axón. Extremo de una neurona, en donde se almacenan los neurotransmisores. (pág. 63)

B

Bandura, Albert (1925–). El psicólogo canadiense estadounidense y la figura principal en el estudio del aprendizaje observacional. Desarrolló la teoría cognitivo social de la personalidad, enfatizando que se debería considerar la situación y los pensamientos del individuo antes, durante y después de un acontecimiento. (págs. 290, 521)

Bartoshuk, Linda (1938–). Renombrada por investigar el papel de la geneticá y el tratamiento de trastornos químicos en los sentidos del gusto y olfato. (pág. 112)

basal metabolic rate/índice de metabolismo basal. Índice del consumo de energía del cuerpo durante el descanso. (pág. 473)

basic research/investigación básica. Ciencia pura cuya mira es aumentar la base de los conocimientos científicos. (págs. 5, A-3)

behavior genetics/genética del comportamiento. Perspectiva de psicología que se concentra en lo mucho que nuestros genes y el medio ambiente influyen nuestras diferencias individuales. (págs. 16, 357)

behavior therapy/terapia conductual. Terapia que aplica principios de apredizaje a la eliminación de comportamientos no deseados. (pág. 594)

behaviorism/conductismo. Perspectiva según la cual la psicología debe limitarse a estudiar la conducta observable y no los procesos mentales. (págs. 10, 257)

Binet, Alfred (1857–1911). Creador de la primera prueba para clasificar la capacidad de los niños empleando el concepto de la edad mental. (pág. 443)

binocular cues/claves binoculares. Señales de profundidad que requieren el uso de los dos ojos. (pág. 122)

biological perspective/perspectiva biológica. Corriente de pensamiento que se concentra en las estructuras físicas y en las sustancias que influencian un comportamiento, pensamiento o sentimiento en particular. (pág. 15)

biological rhythms/ritmos biológicos. Fluctuaciones fisiológicas periódicas. (pág. 140)

biomedical therapy/terapia biomédica. Tratamiento de trastornos psicológicos que supone cambiar el funcionamiento del cerebro con medicamentos recetados, terapia electroconvulsiva o cirugía. (pág. 607)

bio-psycho-social model/modelo biopsicosocial. Perspectiva contemporánea que supone que los trastornos psicológicos se producen por la combinación e interacción de factores biológicos, psicológicos y sociales. (pág. 538)

bipolar disorder/trastorno bipolar. Trastorno anímico (anteriormente se denominaba *enfermedad maníaco depresiva*) en el que el individuo oscila entre la desesperanza de la depresión y la excitación extrema y el estado irracionalmente optimista de la manía. (pág. 561)

blind spot/punto ciego. Punto en el cual el nervio óptico pasa por la retina para salir del ojo. La falta de bastoncillos y conos receptores en este lugar produce un pequeño punto ciego. (pág. 104)

body mass index (BMI)/índice de masa corporal (IMC). Peso de una persona en kilogramos (número de libras multiplicado por 0.45) dividido por el cuadrado de su estatura en metros (número de pulgadas dividido por 39.4). La guía del gobierno estadounidense recomienda un IMC menos de 25. La Organización Mundial de la Salud y muchos países definen la obesidad como un IMC de 30 o más. (pág. 648)

bottom-up processing/procesamiento del fondo hacia arriba. Procesamiento de la información en bruto que entra por los ojos, los oídos y otros órganos de los sentidos. (pág. 95)

brainstem/tronco cerebral. Parte central y más antigua del cerebro, que comienza en donde la médula espinal se ensancha para entrar en el cráneo. Controla las funciones automáticas de la sobrevivencia. (pág. 81)

Broca's area/área de Broca. Parte del lóbulo frontal del cerebro, generalmente en el hemisferio izquierdo, que dirige los movimientos musculares relacionados con el habla. (pág. 89)

bulimia nervosa/bulimia nerviosa. Trastorno de alimentación que se caracteriza por episodios de ingestión excesiva de alimentos, generalmente de alto contenido calórico, seguidos de vómito, uso de laxantes, ayuno o ejercicios físicos excesivos. (pág. 475)

bystander effect/comportamiento de transeúnte. Tendencia de un transeúnte a ser menos capaz de prestar ayuda si están presentes otros transeúntes. (pág. 342)

C

caffeine/cafeína. Estimulante que se halla en el café, el chocolate, el té y algunas bebidas gaseosas. (pág. 164)

Cannon, Walter (1871–1945). Psicólogo estadounidense que, junto con Philip Bard, concluyó que la estimulación fisiológica y la experiencia emocional ocurren simultáneamente (véase la *teoría de Cannon-Bard*). (págs. 481, 623)

Cannon-Bard theory/teoría de Cannon-Bard. Teoría según la cual un estímulo que evoca emociones provoca simultáneamente reacciones fisiológicas y la experiencia subjetiva de la emoción. (pág. 482)

case study/estudio de caso. Técnica de investigación en la cual se estudia a un individuo a fondo con la esperanza de descubrir principios universales. (págs. 25, 79)

Cattell, Raymond [kuh-TELL] (1905–1998). Psicólogo inglés que estudió la posibilidad de que unos rasgos predijeran otros. Propuso 16 dimensiones clave o factores para describir la personalidad. (pág. 515)

central nervous system (CNS)/sistema nervioso central. El cerebro y la médula espinal. (pág. 71)

cerebellum [sehr-uh-BELL-um]/cerebelo. Es el "pequeño cerebro" y está unido a la parte posterior del tronco cerebral; permite coordinar los movimientos voluntarios y el equilibrio. (pág. 82)

cerebral [seh-REE-bruhl] cortex/corteza cerebral. Estructura compleja de células nerviosas conectadas entre sí, que forman los hemisferios cerebrales; principal centro de control y procesamiento de información del organismo. (pág. 84)

Chomsky, Noam (1928–). Lingüista que sostuvo que los niños están predispuestos a aprender el lenguaje, como si su cerebro tuviera un sistema integrado que les permitiera absorber vocabulario y reglas gramaticales. (pág. 302)

chromosomes/cromosomas. Estructuras filamentosas compuestas de moléculas de ADN que contienen los genes. (pág. 358)

chunking/agrupamiento de pensamientos. Información ordenada en unidades coherentes. (pág. 397)

circadian [ser-KAY-dee-un] rhythms/ritmos circadianos. Ritmos biológicos (por ejemplo, de temperatura y estado de vigilia) que ocurren aproximadamente cada 24 horas. (pág. 140)

Clark, Kenneth (1914–2005) y Mamie Phipps Clark (1917–1983). Investigadores cuyo trabajo fue usado en el caso *Brown vs. Junta de Educación* que puso fin a la segregación racial en las escuelas. (pág. 13)

classical conditioning/condicionamiento clásico. Tipo de aprendizaje en el cual un estímulo adquiere el poder de producir una respuesta porque predice otro estímulo que ya produce dicha respuesta. (pág. 250)

client-centered therapy/terapia centrada en el cliente. Tipo de psicoterapia humanista creada por Rogers, en la cual el terapeuta emplea técnicas tales como escuchar activamente dentro de un entorno genuino, con aceptación y empatía, para facilitar el crecimiento personal del cliente. (pág. 592)

cocaine/cocaína. Estimulante que proviene de las hojas de la planta de coca. (pág. 165)

cochlea [KOHK-lee-uh]/cóclea. Órgano principal del oído. Estructura con forma de caracol, ósea y rellena de fluido que se halla en el oído interno en donde las ondas sonoras se convierten en impulsos nerviosos. (pág. 109)

cognition/cognición. Procesos mentales; todas las actividades mentales asociadas con el pensamiento, el saber y el recordar. (págs. 198, 261)

cognitive abilities/habilidades cognitivas. Todas las actividades mentales asociadas con el pensamiento, el conocimiento y la memoria. (pág. 427)

cognitive dissonance theory/teoría de la disonancia cognitiva. La teoría que actuamos con el propósito de reducir la incomodidad (disonancia) que sentimos cuando tenemos dos pensamientos (cogniciones) contradictorios. (pág. 319)

cognitive map/mapa cognitivo. Representación mental de un lugar. (pág. 282)

cognitive perspective/perspectiva cognitiva. Corriente de pensamiento que se concentra en la forma en que absorbemos, procesamos, almacenamos y recuperamos información. (pág. 15)

cognitive therapy/terapia cognitiva. Terapia que enseña la gente nuevas y más adaptables formas de pensar y actuar. (pág. 599)

cognitive-behavioral therapy/terapia cognitiva-conductual. Terapia integrativa que combina el cambio de creencias contraproducentes con el cambio de comportamientos inapropiados. (pág. 601)

collective unconscious/inconsciente colectivo. Concepto de Carl Jung de una reserva compartida y heredada proveniente de rastros de recuerdos de la historia de nuestra antepasados. (pág. 503)

collectivism/colectivismo. Dando prioridad a los objetivos del grupo (a veces la familia extendida o el grupo de trabajo) y definiendo la identidad personal en acuerdo con él. (pág. 374)

companionate love/amor entre personas relacionadas. Apego profundo y cariñoso que sentimos por aquellos con quienes se comparte la vida. (pág. 340)

computerized axial tomography (CT or CAT) scan/tomografía axial computarizada. Serie de radiografías tomadas desde distintos ángulos y combinadas por medio de una computadora que crea una representación de una porción del cuerpo. (pág. 80)

concept/concepto. Agrupación mental basada en semejanzas compartidas. (pág. 428)

concrete operational stage/período operacional concreto. Según la teoría de Piaget, nivel del desarrollo cognitivo (desde aproximadamente los seis o siete años hasta los once años) durante el cual los niños adquieren la capacidad mental que les permite pensar lógicamente en situaciones concretas. (pág. 202)

conditioned response (CR)/respuesta condicionada. Según el condicionamiento clásico, respuesta al estímulo condicionado. (pág. 251)

conditioned stimulus (CS)/estímulo condicionado. Según el condicionamiento clásico, estímulo previamente neutral que, mediante el aprendizaje, ha adquirido el poder de provocar una respuesta condicionada. (pág. 251)

cones/conos. Células receptoras de la vista ubicadas en la retina que detectan los detalles bien definidos y el color. (pág. 104)

confirmation bias/sesgo confirmatorio. Tendencia a concentrarse en la información que confirma las ideas preconcebidas que uno tiene. (págs. 23, 435)

conformity/conformidad. Acomodación del comportamiento o el pensamiento para coincidir con el estándar de un grupo. (pág. 322)

confounding variable/variable de confusión. En un experimento, la variable distinta a la variable independiente que podría influir un cambio sobre la variable dependiente. (pág. 32)

consciousness/consciencia. Conocimiento de uno mismo y su ambiente. (págs. 140, 175)

conservation/conservación. Principio (que Piaget consideraba parte del razonamiento operacional concreto) que sostiene que las propiedades tales como la masa, el volumen y el número se mantienen iguales a pesar de los cambios que ocurren en la forma de los objetos. (pág. 201)

context effect/efecto del contexto. Capacidad de recordar información más fácilmente cuando se está en un ambiente similar al ambiente donde se estaba cuando se adquirió dicha información. (pág. 407)

continuous reinforcement/refuerzo continuo. Según el condicionamiento operante, programa de refuerzo en el cual se da una recompensa después de cada respuesta correcta. (pág. 279)

control group/grupo control. Participantes de un experimento que no están expuestos a la variable independiente. (pág. 31)

convergence/convergencia. Señal de profundidad binocular relacionada con la tensión de los músculos del ojo cuando los ojos se mueven hacia adentro para enfocarse en objetos que están cerca de la cara. (pág. 124)

cornea/córnea. Bulto transparente en la parte anterior del globo ocular. La curvatura de la córnea dobla los rayos luminosos y luego el cristalino del ojo produce una imagen enfocada sobre la retina. (pág. 102)

corpus callosum [KOR-pus kah-LOW-sum]/cuerpo calloso. Franja gruesa de fibras nerviosas que conecta los dos hemisferios cerebrales y transmite mensajes entre los mismos. (pág. 85).

correlation coefficient/coeficiente de correlación. Medida estadística que indica hasta qué punto dos cosas varían de la misma manera. (pág. 51)

correlational study/estudio de correlación. Proyecto de investigación que permite descubrir hasta qué punto dos variables están relacionadas entre sí. (pág. 25)

critical period/período crítico. Etapa óptima inmediatamente después del parto, en la cual la presencia de ciertos estímulos o experiencias produce un desarrollo apropiado del organismo. (pág. 206)

critical thinking/pensamiento crítico. Forma de pensar en la que no se aceptan razones y conclusiones ciegamente. (pág. 24)

cross-cultural research/estudio transcultural. Investigación que prueba hipótesis en varios grupos de personas para averiguar si los principios se aplican a distintas culturas. (pág. 376)

cross-sectional study/estudio transversal. Método de investigación en el cual se comparan individuos de distintas edades al mismo tiempo. (pág. 28)

crystallized intelligence/inteligencia cristalizada. Conocimiento acumulado y capacidad verbal de una persona; tiende a aumentar con la edad. (pág. 239)

culture/cultura. Actitudes, creencias, normas y comportamientos de un grupo que se comunican de generación en generación; posiblemente la cultura asegure la supervivencia del grupo. (págs. 368, 372)

culture-specific/específico de una cultura. Principios que son válidos solamente entre las personas de una cultura en particular. (pág. 376)

D

Darley, John (1938–). Psicólogo que, junto con Bibb Latané, estudió las circunstancias que determinan cuándo un transeúnte intervendrá a favor de otra persona. (pág. 342)

defense mechanisms/mecanismos de defensa. Según la teoría psicoanalítica, estrategias de protección del ego para reducir la ansiedad, en las que se distorsiona inconscientemente la realidad. (pág. 499)

deindividuation/desindividuación. Pérdida de la consciencia de uno mismo y de las inhibiciones, que ocurre cuando se está en un grupo en el que se fomenta la excitación y el anonimato. (pág. 328)

deinstitutionalization/desinstitucionalización. Dar de alta a pacientes de hospitales psiquiátricos permitiéndoles reingresar a la comunidad. (pág. 608)

delusions/delirios. Creencias falsas que son síntomas de esquizofrenia y otros trastornos psicológicos graves. (pág. 574)

Dement, William (1928–). Investigador que estudió el sueño y creó el término *sueño de movimientos oculares rápidos (MOR)*. (pág. 142)

dendrite/dendrita. Prolongación ramificada de la neurona que recibe mensajes y envía impulsos hacia el cuerpo neuronal (soma). (pág. 63)

dependence/dependencia. Necesidad fisiológica o psicológica (o necesidad combinada) de aumentar el consumo de una sustancia después del uso prolongado. (pág. 157)

dependent variable (DV)/variable dependiente (VD). La variable sobre la que influye la variable independiente. (pág. 30)

depressants/depresivos. Sustancias (tales como el alcohol y los sedantes) que reducen la actividad nerviosa y hacen más lentas las funciones del organismo. (pág. 159)

depth perception/percepción de profundidad. Capacidad de ver en tres dimensiones y juzgar la distancia. (pág. 121)

developmental psychology/psicología del desarrollo. Rama de la psicología que estudia los cambios físicos, cognitivos y sociales durante toda la vida. (pág. 198)

difference threshold (just noticeable difference, or jnd)/umbral diferencial (diferencia que apenas se nota). Diferencia mínima que una persona es capaz de detectar entre dos estímulos la mitad de las veces. (pág. 97)

discrimination/discriminación. Según el condicionamiento clásico, capacidad de distinguir entre dos señales o estímulos y formar distintas respuestas. (pág. 256)

discrimination/discriminación. Según el condicionamiento operante, capacidad de distinguir entre dos señales o estímulos similares y formar distintas respuestas. (pág. 277)

discrimination/discriminación. En las relaciones sociales, tomando acción en contra un grupo de personas debido a las creencias estereotipadas y los sentimientos prejuicios. (pág. 344)

display rules/reglas de expresión. Reglas culturales que dictan cómo y cuándo puede una persona expresar sus emociones. (pág. 491)

dissociative amnesia/amnesia disociativa. Trastorno disociativo que se caracteriza por la pérdida de la memoria como reacción a un suceso traumático. (pág. 571)

dissociative disorders/trastornos disociativos. Trastornos en los cuales la identidad de una persona se separa (se disocia) de recuerdos, pensamientos y sentimientos previos. (pág. 570)

dissociative fugue/fuga disociativa. Trastorno disociativo en el que la persona pierde su identidad y viaja para establecerse en otro lugar. (pág. 571)

dissociative identity disorder/trastorno de identidad disociativo. Trastorno disociativo poco común y controvertido, en el cual una persona experimenta dos o más personalidades claramente definidas que se alternan entre sí. (pág. 571)

divided consciousness theory/teoría de la consciencia dividida. Teoría que sostiene que, durante la hipnosis, nuestra consciencia (o conocimiento de nosotros mismos y de los demás) se divide y una parte de ésta no tiene conocimiento del papel que cumplen las otras partes. (pág. 178)

DNA (deoxyribonucleic acid)/ADN (ácido desoxirribonucleico). Molécula compleja que contiene la información genética que forma los cromosomas. (pág. 359)

double-blind procedure/procedimiento doble ciego. Procedimiento experimental en el que tanto los participantes y los recolectores de datos no saben el resultado esperado del experimento. (pág. 34)

drive-reduction theory/teoría de reducción de impulsos. Idea de que una necesidad fisiológica produce la activación de un estado de tensión (impulso) que motiva a un organismo a satisfacer dicha necesidad. (pág. 463)

DSM-IV-TR/Manual diagnóstico y estadístico de trastornos mentales. El *Manual diagnóstico y estadístico de trastornos mentales* de la Asociación Psiquiátrico Estadounidense (cuarta edición, texto revisado); un sistema usado ampliamente para clasificar los trastornos psicológicos. (pág. 539)

dual processing/procesamiento doble. El principio que a menudo, información es procesada distintamente en pistas concientes e inconcientes al mismo tiempo. (pág. 176)

E

Ebbinghaus, Hermann (1850–1909). Filósofo alemán que fue pionero en el estudio de la memoria. (págs. 392, 413)

eclectic approach/perspectiva ecléctica. Enfoque psicoterapéutico que, dependiendo los problemas de la persona, utiliza técnicas de distintas formas de terapia. (pág. 588)

ecstasy/éxtasis. También llamada *MDMA,* esta estimulante alucinógeno reduce las inhibiciones, produce sensaciones agradables y hace aceptar más a los demás. (pág. 166)

effortful processing/procesamiento esforzado. Codificación que requiere atención y esfuerzo continuo. (pág. 391)

ego/ego. Parte "ejecutiva" de la personalidad y mayormente consciente que, según Freud, actúa como mediadora entre las exigencias del ello, el superyó y la realidad. El ego funciona a partir del principio de la realidad y busca satisfacer los deseos del ello (o id) de maneras que, siendo realistas, brindarán placer en vez de dolor. (pág. 499)

egocentrism/egocentrismo. Según la teoría de Piaget, incapacidad del niño preoperacional de tomar el punto de vista de otra persona o de entender que los símbolos pueden representar otros objetos. (pág. 202)

electroconvulsive therapy (ECT)/terapia electroconvulsiva. Terapia para el tratamiento de la depresión grave. Consiste en el suministro de breves descargas eléctricas al cerebro del paciente, mientras éste está bajo anestesia. (pág. 614)

electroencephalogram (EEG)/electroencefalograma. Registro amplificado de las ondas de actividad eléctrica provenientes de la superficie del cerebro. Estas ondas se miden con electrodos colocados sobre el cuero cabelludo y permiten evaluar el funcionamiento del cerebro. (pág. 81)

electroencephalograph (EEG)/electroencefalógrafo. Instrumento que amplifica y registra las ondas de actividad eléctrica provenientes de la superficie del cerebro. Estas ondas se miden con electrodos colocados sobre el cuero cabelludo. (pág. 145)

embryo/embrión. Organismo humano en desarrollo, desde aproximadamente la segunda semana después de la fecundación hasta el final de la octava semana. (pág. 192)

emerging adulthood/adultez emergente. Un período de adolescencia a mediados de los veinte años (y a veces hasta más tarde) que llena el vacío entre la dependencia adolescente y la independencia completa y la adultez responsable. (pág. 233)

emotional intelligence/inteligencia emocional. Capacidad de percibir, expresar, entender y regular las emociones. (pág. 442)

emotions/emociones. Respuestas de todo el organismo que presentan estimulación fisiológica, comportamientos expresivos y experiencia consciente. (pág. 480)

encoding/codificación. Proceso de obtener información en el sistema de la memoria. (pág. 390, 411)

endocrine [EN-duh-krin] system/sistema endocrino. Uno de los dos sistemas de comunicación del cuerpo; conjunto de glándulas que producen hormonas, los mensajeros químicos que circulan en sangre. (pág. 73)

environment/ambiente. Toda influencia que no es genética, desde la alimentación prenatal hasta las personas y las cosas que nos rodean. (pág. 357)

equity/equidad. Condición dentro de una relación en la cual las personas reciben en proporción a lo que dan. (pág. 340)

Erikson, Erik (1902–1994). Fundador de la teoría de las ocho etapas del desarrollo psicosocial. (pág. 222)

ethnocentrism/etnocentrismo. Tendencia a ver el mundo a partir de las experiencias personales y a través de los "filtros culturales" que uno tiene. (pág. 379)

evolutionary psychology/psicología evolutiva. Corriente de pensamiento que se centra el los principios de la selección natural para estudiar las raíces del comportamiento y los procesos mentales. (pág. 17)

excitatory effect/efecto excitador. Efecto de un neurotransmisor que aumenta la probabilidad de que la neurona receptora genere un potencial de acción (impulso). (pág. 66)

experiment/experimento. Método de investigación en la cual el investigador manipula y controla ciertos factores para observar su efecto en otras variables. (pág. 29)

experimental group/grupo experimental. Sujetos de un experimento que están expuestos al tratamiento, o sea, a la variable independiente. (pág. 31)

explanatory style/estilo explicativo. Costumbres que se adquieren al pensar en las buenas o las malas causas de los sucesos. (pág. 644)

explicit memory/memoria explícita. Memoria de hechos y experiencias. (pág. 404)

external locus of control/locus de control externo. Impresión de que nuestro destino está controlado por el azar o por fuerzas que están más allá de nuestro control. (pág. 524)

extinction/extinción. En el condicionamiento clásico, disminución de un comportamiento aprendido después de la presentación repetida de sólo el estímulo condicionado. (pag. 252)

extinction/extinción. En el condicionamiento operante, pérdida de un comportamiento cuando no está seguido de una consecuencia. (pág. 277)

extrasensory perception (ESP)/percepción extrasensorial. Idea polémica que propone la posibilidad de que la percepción ocurra por una vía distinta de la estimulación de los sentidos. (pág. 131)

extrinsic motivation/motivación extrínseca. Deseo de llevar a cabo un comportamiento porque promete recompensas o existe la amenaza de un castigo. (pág. 466)

Eysenck, Hans [EYE-zink] (1916–1997). Psicólogo alemán que investigó las dimensiones de la personalidad que tienen influencia genética, incluidas la extraversión y la introversión. (pág. 516)

F

family therapy/terapia de familia. Terapia que trata a la familia como a un sistema. Considera que los comportamientos inapropiados de un individuo son influenciados por otros miembros de la familia o dirigidos hacia ellos; guía a los miembros de la familia para que logren tener relaciones positivas y mejorar la comunicación. (pág. 603)

fetal alcohol syndrome (FAS)/síndrome de alcoholismo fetal. Anormalidades físicas y cognitivas que aparecen en los niños cuyas madres consumen grandes cantidades de alcohol durante el embarazo. (pág. 194)

fetus/feto. Organismo humano en desarrollo, desde la novena semana después de la concepción hasta el nacimiento. (pág. 193)

figure-ground/figura y fondo. Disposición del campo visual en donde los objetos (las figuras) resaltan en su entorno (el fondo). (pág. 120)

fixation/fijación. Predisposición mental que dificulta la solución a un problema. (pág. 432)

fixed-interval schedule/programa de intervalo fijo. En el condicionamiento operante, programa de reforzamiento parcial en el cual se suministra una recompensa solamente para la primera respuesta correcta, después de haber transcurrido un determinado período de tiempo. (pág. 279)

fixed-ratio schedule/programa de proporción fija. En el condicionamiento operante, programa de reforzamiento parcial en el cual se suministra una recompensa solamente después de que haya ocurrido un número definido de respuestas correctas. (pág. 281)

flashbulb memory/memoria episódica. Recuerdo vívido y claro de un momento o suceso emocionalmente significativo. (pág. 403)

flow/fluidez. Estado óptimo de experiencia; para que ocurra la fluidez, las experiencias deben significar un desafío que requiera destreza, metas claras y la producción de respuestas. (pág. 642)

fluid intelligence/inteligencia fluida. Capacidad de una persona de razonar de manera rápida y abstracta. (pág. 239)

foot-in-the-door phenomenon/fenómeno del pie en la puerta. Tendencia de las personas que accedieron a un pedido menor de acceder luego a un pedido de mayores proporciones. (pág. 317)

formal operational stage/período operacional formal. Según la teoría de Piaget, etapa del desarrollo cognitivo (normalmente desde los doce años) durante la cual las personas comienzan a pensar de manera lógica en conceptos abstractos y a formar estrategias. (pág. 203)

framing/encuadre. Forma en que se presenta una cuestión; el encuadre puede influenciar las decisiones y las opiniones. (pág. 437)

fraternal twins/gemelos bivitelinos. Hermanos gemelos que se forman de dos óvulos distintos. En términos genéticos, su relación no es más cercana que la que existe con los demás hermanos y hermanas, excepto que comparten el ambiente fetal. (pág. 361)

free association/asociación libre. En el psicoanálisis, método para explorar el inconsciente durante el cual la persona se siente tranquila y dice todo lo que le viene a la mente, sin importarle lo trivial o incómodo que sea lo que dice. (pág. 497)

frequency distribution/distribución de frecuencias. Lista de puntajes ordenados de mayor a menor. (pág. 43)

Freud, Sigmund (1856–1939). Fundador del psicoanálisis, una teoría controvertida acerca del funcionamiento de la parte inconsciente de la mente. (págs. 9, 417, 496, 587)

frontal lobes/lóbulos frontales. Porción de la corteza cerebral que se halla inmediatamente detrás de la frente; incluye la corteza motora y se relaciona con la planificación y la formación de opiniones. (pág. 85)

functional fixedness/fijeza funcional. Tendencia a pensar en las cosas solamente en términos de sus funciones acostumbradas; impedimento en la resolución de problemas. (pág. 432)

functionalism/funcionalismo. Teoría que enfatizaba las funciones de la consciencia y las formas en que ésta permitía a las personas adaptarse a su ambiente. (pág. 8)

fundamental attribution error/error fundamental de la atribución. Tendencia a atribuir el comportamiento de otros a las disposiciones internas en lugar de a las situaciones. (pág. 312)

G

Gardner, Howard (1943–). Autor de una teoría contemporánea de inteligencias múltiples que distingue entre ocho tipos distintos de inteligencia. (pág. 440)

gender/género. Nuestra definición de hombre y mujer, basada en características influenciadas socialmente y culturalmente, así como la biología. (pág. 381)

gender identity/identidad de género. Nuestro sentido de ser hombre o mujer. (pág. 382)

gender role/papel de género. Conjunto de creencias existentes sobre los comportamientos de los hombres y de las mujeres. (pág. 382)

general adaptation syndrome (GAS)/síndrome de adaptación general. Concepto de Selye según el cual el cuerpo responde al estrés pasando por tres fases: la inquietud, la resistencia y el agotamiento. (pág. 624)

general intelligence *(g)*/inteligencia general *(g)*. Segun Charles Spearman, el factor que subyace todas las inteligencias múltiples. (pág. 443)

generalization/generalización. Proceso en el cual un organismo genera la misma respuesta a dos estímulos similares. (pág. 255)

generalized anxiety disorder/trastorno de ansiedad generalizado. Trastorno que se caracteriza por sentimientos persistentes e inexplicables de aprensión y tensión que alcanzan niveles perjudiciales. (pág. 551)

genes/genes. Unidades bioquímicas de la herencia que forman cromosomas. (págs. 192, 357)

gestalt/gestalt. Se dice del "todo", o patrones de organización, que tendemos a percibir. Los psicólogos que ejercían la psicología Gestalt enfatizaban la idea de que el todo es más grande que la suma de las partes que lo componen. (pág. 119)

Gestalt [gih-SHTALT] psychology/psicología Gestalt. Perspectiva psicológica que enfatiza nuestra tendencia a integrar datos para formar totalidades significativas. (pág. 7)

grammar/gramática. Sistema de reglas que dicta cómo combinar morfemas y palabras y ordenarlos en oraciones para comunicarnos con los demás. (pág. 300)

group polarization/polarización grupal. Potenciación de las actitudes predominantes de un grupo, cuando los miembros de éste se hallan enfrascados en una conversación. (pág. 329)

grouping/agrupamiento. Tendencia de percepción que clasifica los estímulos en grupos que tienen sentido. (pág. 120)

groupthink/pensamiento grupal. Modo de pensar que ocurre en un grupo que debe tomar decisiones, cuando el deseo de mantener la armonía, anula una evaluación realista de las alternativas. (pág. 330)

H

hair cells/células ciliares. Células receptoras sensibles al sonido, que se hallan en la cóclea y se encargan de convertir las vibraciones del sonido en impulsos nerviosos. (pág. 109)

hallucinations/alucinaciones. Percepciones falsas que son síntomas de la esquizofrenia y otros trastornos psicológicos graves. (pág. 575)

hallucinogens/alucinógenos. Drogas psicodélicas, tales como el ácido lisérgico y dietilamina, que distorsionan las percepciones y provocan imágenes sensoriales sin la presencia de estimulación sensorial. (pág. 167)

health psychology/psicología de la salud. Extensión de la psicología que se centra en cómo el estrés afecta el bienestar y la salud. (pág. 622)

heritability/heredabilidad. Proporción de la variación entre individuos que es posible atribuir a la herencia. (pág. 361)

heuristic/heurística. Regla práctica en la estrategia de resolución de problemas que hace que una solución sea más probable y eficaz, pero que no garantiza soluciones. (pág. 431)

hierarchy of needs/jerarquía de necesidades. Pirámide de Maslow de las necesidades humanas, en cuya base están las necesidades fisiológicas, y luego siguen las necesidades de seguridad personal y, por último, las necesidades psicológicas. Las necesidades de nivel más elevado no se activan hasta que las de niveles más bajos estén satisfechas. (pág. 468)

Hilgard, Ernest (1904–2001). Investigador pionero en el campo de la hipnosis y defensor de la teoría de la consciencia dividida. (pág. 178)

hippocampus/hipocampo. Centro nervioso ubicado en el sistema límbico; participa en el procesamiento de recuerdos nuevos para su almacenamiento permanente. (pág. 84)

homeostasis/homeóstasis. Tendencia a mantener un estado interno equilibrado y constante. (pág. 465)

hormone/hormona. Mensajero químico producido por las glándulas endocrinas que circula en sangre. (pág. 73)

Horney, Karen [HORN-eye] (1885–1952). Neofreudiana que consideraba que el psicoanálisis estaba prejuiciado en contra de la mujer y creía que las variables culturales eran la base del desarrollo de la personalidad. (pág. 503)

humanistic psychology/psicología humanista. Perspectiva que enfatiza el estudio de la experiencia consciente, la libertad de decisión del individuo y la capacidad de crecimiento personal. (págs. 10, 506)

hypnosis/hipnosis. Interacción social en la cual un hipnotizador hace sugerencias relacionadas con percepciones, sentimientos, pensamientos o comportamientos y después esas sugerencias son seguidas. (pág. 177)

hypochondriasis/hipocondría. Trastorno somatoforme que se caracteriza por síntomas de enfermedad imaginarios. (pág. 573)

hypothalamus [hi-po-THAL-uh-muss]/hipotálamo. Estructura nerviosa ubicada debajo del tálamo; dirige actividades de mantenimiento tales como la ingestión de alimentos y de líquidos y la temperatura del cuerpo, y está ligado a las emociones. (pág. 84)

hypothesis/hipótesis. Predicción comprobable sobre el resultado de una investigación. (pág. 29)

I

id/ello. Según Freud, parte de la personalidad compuesta por energía psíquica e inconsciente que busca satisfacer los impulsos sexuales y agresivos básicos. Funciona de acuerdo con el principio del placer y requiere satisfacción inmediata. (pág. 499)

identical twins/gemelos univitelinos. Gemelos que se forman de un sólo óvulo fecundado, el cual se divide en dos y crea dos organismos idénticos. (pág. 361)

identity/identidad. Sentido de uno mismo; de acuerdo con Erikson, la tarea del adolescente es solidificar el sentido de sí mismo probando e integrando una variedad de roles. (pág. 223)

implicit memory/memoria implícita. Memoria de habilidades y procedimientos. (pág. 404)

imprinting/impronta. Proceso mediante el cual ciertos animales forman apegos durante un período crítico que ocurre a muy temprana edad. (pág. 206)

independent variable (IV)/variable independiente (VI). Variable de un experimento que el investigador manipula activamente y, si la hipótesis es correcta, producirá un cambio en la variable dependiente. (pág. 30)

individualism/individualismo. Dando prioridad a metas personales más que a las metas del grupo y definiendo la identidad de acuerdo con las cualidades personales en vez que la identificación del grupo. (pág. 374)

inferential statistics/estadística inferencial. Estadística que se puede emplear para tomar una decisión o llegar a una conclusión basada en los datos. (pág. 53)

inferiority complex/complejo de inferioridad. De acuerdo con Alfred Adler, estado que resulta de la incapacidad de compensar por sentimientos normales de inferioridad. (pág. 503)

infradian (in-FRAY-dee-un) rhythms/ritmos infradianos. Ritmos biológicos que ocurren una vez al mes o una vez por estación. (pág. 141)

ingroup/grupo propio. "Nosotros", o sea, las personas con las que uno comparte una identidad en común. (pág. 346)

ingroup bias/estereotipo de grupo propio. Tendencia a favorecer al grupo al que uno pertenece. (pág.346)

inhibitory effect/efecto inhibitorio. Efecto de un neurotransmisor que hace menos probable que la neurona receptora genere un potencial de acción (impulso). (pág. 66)

insight/agudeza. Entendimiento repentino (¡Ajá!) de cómo se resuelve un problema. (pág. 431)

insomnia/insomnio. Dificultad recurrente para conciliar el sueño o para mantenerse dormido. (pág. 151)

instinct/instinto. Comportamiento complejo y heredado que está rigurosamente estampada a través de una especie. (pág. 462)

intelligence/inteligencia. Capacidad de aprender de la experiencia, resolver problemas y emplear conocimientos para adaptarse a situaciones nuevas. (pág. 440)

intelligence quotient (IQ))/coeficiente intelectual (CI). Número derivado de la fórmula de Terman y Stern, que se emplea para calcular el nivel de inteligencia de una persona: edad mental (EM) dividida por la edad cronológica (EC) multiplicada por 100. (pág. 445)

internal locus of control/locus de control interno. Impresión de que controlamos nuestro propio destino. (pág. 524)

interneurons/interneuronas. Células nerviosas del cerebro y la médula espinal que se encargan de procesar información. (pág. 67)

interpretation/interpretación. En el psicoanálisis, observación que hace el analista de supuestos significados de sueños, resistencias y otros comportamientos significativos, con el propósito de facilitar el entendimiento. (pág. 589)

intimacy/intimidad. Según la teoría de Erikson, capacidad de formar relaciones cercanas, afectivas y abiertas; tarea primaria del comienzo de la vida adulta. (pág. 225)

intrinsic motivation/motivación intrínseca. Deseo de llevar a cabo un comportamiento por el sólo hecho de hacerlo y de tener el resultado esperado. (pág. 466)

iris/iris. Aro de tejido muscular que forma la parte coloreada del ojo y regula el tamaño de la pupila. (pág. 102)

J

James, William (1842–1910). Primer psicólogo estadounidense y escritor del primer libro de texto de psicología, que pensaba que nuestra consciencia de las reacciones fisiológicas nos lleva a sentir las emociones (véase *la teoría de James-Lange*). (págs. 8, 481)

James-Lange theory/teoría de James-Lange. Teoría según la cual nuestra experiencia de una emoción es la consciencia que tenemos de nuestras reacciones fisiológicas ante un estímulo que evoca emociones. (pág. 481)

Jung, Carl [YOO-ng] (1875–1961). Neofreudiano que pensaba que los seres humanos comparten un *inconsciente colectivo*. (pág. 503)

just-world phenomenon/fenómeno de un mundo justo. Tendencia a suponer que las personas reciben lo que merecen y merecen lo que reciben. (pág. 348)

K

Kahneman, Daniel (1934–). Psicólogo que, junto con Amos Tversky, realizó estudios para descubrir los factores que influyen en las opiniones y la toma de decisiones de los seres humanos. Su trabajo lo llevó a obtener el premio Nobel en 2002. (pág. 435)

kinesthetic sense/sentido cinético. Sistema que permite sentir la posición y el movimiento de las partes del cuerpo. (pág. 114)

Kohlberg, Lawrence (1927–1987). Creó una teoría que divide al desarrollo moral en tres etapas. (pág. 219)

L

Lange, Carl (1834–1900). Fisiólogo danés que propuso, casi simultáneamente, una teoría de las emociones similar a la de William James, que propone que nuestra consciencia de las respuestas fisiológicas nos lleva a experimentar las emociones (véase *la teoría de James-Lange*). (pág. 481)

language/lenguaje. Palabras habladas, escritas o gesticuladas y las formas en las que las combinamos para comunicar significados. (pág. 298)

Latané, Bibb (1937–). Psicólogo que, junto con John Darley, estudió las circunstancias que determinan cuándo un transeúnte intervendrá a favor de otra persona. (pág. 342)

latent learning/aprendizaje latente. Aprendizaje que ocurre pero no es aparente hasta que la persona tiene un incentivo para manifestarlo. (pág. 282)

Lazarus, Richard (1922–2002). Psicólogo estadounidense que concluyó que algunas respuestas emocionales no requieren pensamientos conscientes pero aún involucran una forma de evaluación cognitiva inconsciente. (pág. 484)

learned helplessness/impotencia aprendida. Desesperanza y resignación pasiva que aprende un animal o ser humano cuando es incapaz de evitar una sucesión de episodios desagradables. (pág. 525)

learning/aprendizaje. Cambio relativamente permanente del comportamiento debido a la experiencia. (pág. 250)

lens/cristalino del ojo. Estructura transparente ubicada detrás de la pupila del ojo que cambia de forma para enfocar las imágenes en la retina. (pág. 102)

limbic system/sistema límbico. Aro de estructuras ubicadas en el borde del tronco cerebral y la corteza cerebral; contribuye a la regulación de funciones importantes tales como la memoria, el

miedo, la agresión, el hambre y la sed. Incluye el hipotálamo, el hipocampo y la amígdala. (pág. 83)

lobotomy/lobotomía. Tipo de psicocirugía, actualmente rara, que se empleaba para calmar a pacientes emocionalmente incontrolables o violentos. El procedimiento consiste en cortar los nervios que conectan los lóbulos frontales del cerebro con los centros emocionales más profundos. (pág. 616)

locus of control/locus de control. Impresión que tiene una persona acerca de la fuente de control de las recompensas. Las personas que tienen un locus de control interno creen que controlan sus propias recompensas a través de su conducta. Las personas que tienen un locus de control externo creen que las recompensas son controladas por circunstancias externas. (pág. 378)

Loftus, Elizabeth (1944–). Psicóloga de la Universidad de California, Irvine, cuya investigación demostró la naturaleza estructurada de la memoria. (pág. 418)

longitudinal fissure/cisura interhemisférica. Surco largo que se extiende desde la parte anterior hasta la parte posterior de la corteza cerebral y separa el hemisferio derecho del izquierdo. (pág. 85)

longitudinal study/estudio longitudinal. Técnica de investigación en la cual se estudia el mismo grupo de individuos durante un largo período de tiempo. (pág. 28)

long-term memory/memoria remota. Centro de almacenamiento relativamente permanente e ilimitado del sistema de la memoria. (pág. 401)

long-term potentiation/potenciación a largo plazo. Aumento en la eficacia de una sinapsis para transmitir impulsos. Se considera la base nerviosa del aprendizaje y la memoria. (pág. 403)

Lorenz, Konrad (1903–1989). Investigador que estudió las etapas críticas de apego en los pichones de aves, concepto que denominó impronta. (pág. 206)

LSD (lysergic acid diethylamide)/ácido lisérgico y dietilamina. Poderosa droga alucinógena; también se conoce como ácido. (pág. 167)

M

magnetic resonance imaging (MRI)/imágenes de resonancia magnética. Técnica que emplea campos magnéticos y ondas de radio para producir imágenes generadas por una computadora en las que se distingue entre los distintos tipos de tejidos blandos; nos permite ver las estructuras cerebrales. (pág. 80)

major depressive disorder/trastorno de depresión grave. Trastorno del estado de ánimo en el que un individuo, sin razón aparente, experimenta por lo menos dos semanas de depresión, disminución de interés en actividades y síntomas tales como la sensación de que su vida no tiene valor. (pág. 560)

marijuana/marihuana. Hojas, tallos, resina y flores de la planta de cáñamo que, al fumarse, reduce las inhibiciones y produce sensaciones de tranquilidad y euforia leve. (pág. 168)

Maslow, Abraham (1908–1970). Psicólogo humanista que propuso una jerarquía de necesidades, en donde la realización personal es la máxima necesidad psicológica. (pág. 468, 507)

Matsumoto, David (1959–). Psicólogo y experto internacional en el estudio de la psicología transcultural. (pág. 372)

maturation/maduración. Procesos de crecimiento biológico que permiten cambios ordenados en el comportamiento y son relativamente independientes de la experiencia. (pág. 195)

mean/media. Promedio aritmético de una distribución, que se obtiene sumando los puntajes y luego dividiéndolos por el número de puntajes. (pág. 45)

median/mediana. Puntaje que está en el medio de una distribución clasificada; la mitad de los puntajes está por encima de la mediana y la otra mitad, por debajo. (pág. 45)

medical model/modelo médico. Concepto que afirma que las enfermedades tienen causas físicas que pueden ser diagnosticadas, tratadas y en la mayoría de los casos, curadas. (pág. 537)

medulla [muh-DUL-uh]/médula. Base del tronco cerebral; controla las funciones vitales, tales como el latido del corazón y la respiración. (pág. 82)

melatonin/melatonina. Hormona que contribuye a la regulación de los ritmos biológicos diarios. (pág. 144)

menopause/menopausia. Período de la vida en que cesa naturalmente la menstruación; también se refiere a los cambios biológicos que experimenta una mujer a medida que disminuye su capacidad de reproducción. (pág. 235)

mental age (MA)/edad mental. Edad cronológica que corresponde con el nivel de dificultad de las preguntas que un niño es capaz de contestar. (pág. 444)

mental set/predisposición mental. Tendencia a resolver problemas de una forma en particular. (pág. 432)

mere exposure effect/efecto de mera exposición. Fenómeno en el cual la exposición repetida a estímulos novedosos aumenta el agrado que se siente ante dichos estímulos. (pág. 336)

Milgram, Stanley (1933–1984). Psicólogo social que investigó la obediencia a la autoridad. (pág. 325)

Minnesota Multiphasic Personality Inventory (MMPI)/Inventario Multifásico de la Personalidad de Minnesota. Prueba de la personalidad que es, entre todas, la más ampliamente estudiada y empleada clínicamente. Se elaboró originalmente para identificar trastornos emocionales, y aún hoy este uso se considera el más apropiado. Actualmente también se emplea para muchos otros propósitos de examinación. (pág. 519)

mirror neurons/neuronas espejo. Células cerebrales localizadas en la parte delantera del cerebro que se activan al ejectuar ciertas acciones o al observar la misma actividad ejecutada por otro individuo. (pág. 293)

misinformation effect/efecto de información errónea. Incorporación de información engañosa en la memoria de un acontecimiento. (pág. 419)

mnemonic [nih-MON-ik] device/recurso nemotécnico. Técnica para auxiliar a la memoria. (pág. 396)

mode/moda. Puntaje que ocurre más frecuentemente en una distribución. (pág. 44)

model/modelo. Persona que se observa en el aprendizaje por observación. (pág. 290)

modeling/modelar. Proceso de observar e imitar un comportamiento en particular. (pág. 290)

monocular cues/claves monoculares. Señales de profundidad que requieren el uso de un solo ojo. (pág. 122)

morpheme/morfema. En el lenguaje, unidad más pequeña con significado. (pág. 300)

motivation/motivación. Necesidad o deseo que vigoriza y dirige el comportamiento. (pág. 462)

motor cortex/corteza motora. Parte del cerebro en la parte posterior de los lóbulos frontales, que controla los movimientos voluntarios. (pág. 86)

Murray, Henry (1893–1988). Neofreudiano, fue el primero en establecer el concepto de motivación de logro; también creó importantes mecanismos para evaluar la personalidad. (pág. 470)

mutation/mutación. Errores en la duplicación de los genes, que se producen al azar y resultan en un cambio en el código genético de un individuo y son la fuente de toda la diversidad genética. (pág. 360)

N

narcolepsy/narcolepsia. Trastorno caracterizado por ataques incontrolables de sueño. El individuo entra directamente en el sueño REM, generalmente en momentos inoportunos. (pág. 153)

naturalistic observation/observación naturalista. Observación y registro de comportamientos en situaciones que ocurren naturalmente, sin tratar de manipular y controlar dichas situaciones. (pág. 24)

negative reinforcement/reforzamiento negativo. En el condicionamiento operante, cualquier cosa que aumenta la probabilidad que se produzca un comportamiento por seguirlo con la eliminación de un suceso o estado desagradable. (pág. 272)

neuron/neurona. Célula nerviosa; unidad básica del sistema nervioso. (pág. 62)

neurotransmitter/neurotransmisor. Mensajero químico que, al ser liberado por una neurona, atraviesa la sinapsis (espacio entre dos neuronas) y entra en los receptores de las neuronas receptoras, formando el siguiente eslabón en la cadena de comunicación del sistema nervioso. (pág. 65)

nicotine/nicotina. Estimulante del comportamiento que se halla en el tabaco. (pág. 164)

night terrors/terrores nocturnos. Trastorno del sueño caracterizado por excitación fisiológica intensa y expresión de miedo extremo en la cara del sujeto. A diferencia de las pesadillas, los terrores nocturnos ocurren durante la fase 3 del sueño NMOR en las primeras dos o tres horas de estar dormido y raramente son recordados. (pág. 153)

normal distribution/distribución normal. Una distribución de frecuencias que tiene forma de una campana simétrica. (pág. 48)

norms/normas. Reglas establecidas para el comportamiento aceptado y esperado. (pág. 368)

O

obedience/obediencia. Tendencia a hacer caso a las órdenes, ya sea implícitas o explícitas, de alguien a quien se percibe como autoridad. (pág. 325)

object permanence/permanencia del objeto. Consciencia de que las cosas continúan existiendo aún cuando no se las ve ni se las escucha. (pág. 200)

observational learning/aprendizaje observacional. Aprendizaje que ocurre por la observación a otras personas. (pág. 290)

obsessive-compulsive disorder (OCD)/trastorno obsesivo-compulsivo. Trastorno de ansiedad que se caracteriza por pensamientos y acciones indeseadas y repetitivas. (pág. 551)

occipital [ahk-SIP-uh-tuhl] lobes/lóbulos occipitales. Porción de la corteza cerebral ubicada en la parte posterior de la cabeza; incluye las áreas de procesamiento de la visión. (pág. 86)

operant conditioning/condicionamiento operante. Tipo de aprendizaje en el que la frecuencia de un comportamiento depende de las consecuencias que éste provoca. (pág. 267)

operational definition/definición operacional. Especificación de los procedimientos exactos que se deben llevar a cabo para que una variable sea específica y se pueda medir durante un experimento. (pág. 29)

opponent-process theory/teoría de los colores opuestos. Teoría de la visión del color según la cual el color se procesa en pares de opuestos (rojo-verde, amarillo-azul y negro-blanco). Cuando la luz estimula la mitad de un par, inhibe la otra mitad. (pág. 106)

optic nerve/nervio óptico. Nervio que lleva información visual desde el ojo hasta los lóbulos occipitales del cerebro. (pág. 104)

other-race effect/effecto de otras razas. Tendencia a recordar la caras de su propia raza con mejor precisión que las caras de otras razas. (pág. 347)

outgroup/grupo ajeno. "Ellos", o sea, las personas a las que percibimos como distintas o separadas de "nosotros". (pág. 346)

overconfidence/exceso de confianza. Cuando la confianza es más que la precisión. (pág. 436)

overjustification effect/efecto de justificación excesiva. Efecto de prometer una recompensa por algo que a uno de antemano le gusta hacer. La recompensa podría disminuir y reemplazar la motivación original y natural de la persona, por lo que el comportamiento se interrumpe si la recompensa se elimina. (pág. 283)

P

panic disorder/trastorno del pánico. Trastorno de ansiedad que se caracteriza por ataques repentinos de pánico intenso e inexplicable y con frecuencia asociada con síntomas físicos como la sensación de ahogo o la falta de aliento. (pág. 551)

parasympathetic division/división parasimpática. Parte del sistema nervioso autónomo que calma el cuerpo. (pág. 72)

parietal [puh-RYE-uh-tuhl] lobes/lóbulos parietales. Porción de la corteza cerebral ubicada en la parte superior de la cabeza y hacia atrás; incluye la corteza somatosensorial y las áreas de asociación general que participan en el procesamiento de información. (pág. 86)

partial reinforcement schedule/programa de reforzamiento parcial. En el condicionamiento operante, programa de reforzamiento que premia sólo algunas respuestas correctas. (pág. 279)

participant bias/parcialidad de participante. Tendencia de los participantes de un experimento a responder de cierta manera porque saben que se los está observando o creen saber lo que tiene en mente el investigador. (pág. 24)

passionate love/amor apasionado. Estado de entusiasmo y concentración positiva e intensa en otra persona, que generalmente se presenta al comienzo de una relación amorosa. (pág. 339)

Pavlov, Ivan (1849–1936). Fisiólogo ruso que se hizo famoso por su descubrimiento del condicionamiento clásico en donde el aprendizaje ocurre a través de la asociación. (págs. 9, 253)

percentage/porcentaje. Estadística comparativa en la que se compara un puntaje con un puntaje perfecto, suponiendo que el puntaje perfecto es de 100 puntos. (pág. 50)

percentile rank/categoría de porcentil. Estadística comparativa en la que se compara un puntaje con otros, suponiendo que hay cien puntajes en total. (pág. 50)

perception/percepción. Proceso de organización e interpretación de información sensorial. (pág. 95, 118)

perceptual constancy/constancia perceptiva. Percepción de que el tamaño, la forma y el peso de un objeto no cambian, aún cuando cambie la imagen de dicho objeto en la retina. (pág. 128)

perceptual set/predisposición perceptiva. Predisposición mental a percibir algo de una manera y no de otra. (pág. 130)

peripheral nervous system (PNS)/sistema nervioso periférico. Nervios sensoriales y motores que conectan el sistema nervioso central con el resto del cuerpo. (pág. 71)

permastore memory/memoria permanente. Recuerdos de la memoria remota que son especialmente resistentes al olvido y se conservan generalmente toda la vida. (pág. 414)

permissive parenting/crianza permisiva. Estilo de crianza en el cual los padres se someten a los deseos de los niños, tienen pocas exigencias y emplean pocos castigos. (pág. 208)

personality/personalidad. Patrones de pensamiento, sentimiento y comportamiento característicos de un individuo. (págs. 495, 513)

personality disorders/trastorno de personalidad. Trastornos psicológicos caracterizados por patrones de comportamiento inflexibles y duraderos que perturban el funcionamiento social. (pág. 579)

personality inventories/inventarios de personalidad. Cuestionarios (que generalmente se responden con las opciones verdadero-falso o de acuerdo–en desacuerdo) en los que se responde a preguntas diseñadas para medir una amplia variedad de sentimientos y comportamientos; se emplean para evaluar rasgos de la personalidad escogidos. (pág. 518)

phobia/fobia. Un trastorno de ansiedad caracterizado por el temor perturbador e irracionales a objetos, actividades o situaciones. (pág. 551)

phoneme/fonema. En el lenguaje hablado, unidad más pequeña en la que se distingue un sonido. (pág. 299)

Piaget, Jean [pee-ah-ZHAY] (1896–1980). Pionero en el estudio de la psicología del desarrollo; propuso una teoría de las etapas del desarrollo cognitivo que condujo a un mejor entendimiento de los procesos del pensamiento de los niños. (págs. 11, 198, 218)

Pinel, Philippe (1745–1826). Médico francés que se dedicó a reformar el tratamiento de las personas con trastornos mentales. (pág. 537)

pitch/tono. Intensidad de un sonido, que depende de la frecuencia de una onda sonora. (pág. 107)

pituitary gland/glándula pituitaria. "Glándula maestra" del sistema endocrino. Su importancia es tal que, junto con el cerebro, controla las demás glándulas endocrinas. (pág. 73)

placebo/placebo. Sustancia o condición inactiva que se utiliza para control de los variables confundentes. (págs. 34, 183)

plasticity/plasticidad. La capacidad del cerebro para cambiar, especialmente durante la infancia, por reorganizarse después de una lesión o experiencia. (pag. 88)

population/población. Todos los casos de un grupo, entre los cuales se pueden extraer muestras para un estudio. (pág. 28)

positive psychology/psicología positiva. Movimiento en la psicología que se concentra en el estudio del funcionamiento óptimo del ser humano y en los factores que permiten la prosperidad de individuos y comunidades. (págs. 17, 525, 641)

positive reinforcement/reforzamiento positivo. En el condicionamiento operante, cualquier cosa que aumenta la probabilidad de que se produzca un comportamiento cuando se proporciona un suceso o estado deseable. (pág. 271)

positron emission tomography (PET) scan/tomografía por emisión de positrones. Muestra visual de la actividad cerebral. (pág. 81)

posthypnotic suggestion/sugestión poshipnótica. Sugestión hecha durante una sesión de hipnosis, para que el sujeto la cumpla cuando ya no esté hipnotizado. (pág. 181)

post-traumatic stress disorder (PTSD)/trastorno de estrés postraumático. Trastorno en el que se repite la experiencia de un suceso muy perturbador en recuerdos y sueños recurrentes. (pág. 551)

preconscious/preconsciente. Según Freud, la región de la mente en donde existe información que no es consciente pero que puede ser recordada conscientemente. (pág. 497)

prejudice/prejuicio. Actitud injustificable (y frecuentemente negativa) hacia un grupo y sus miembros. (pág. 344)

preoperational stage/etapa preoperacional. Según la teoría de Piaget, etapa (aproximadamente desde los dos hasta los siete años) durante la cual el niño aprende a emplear el lenguaje pero aún no comprende las operaciones mentales de lógica concreta. (pág. 201)

primary reinforcement/reforzamiento primario. Algo que refuerza naturalmente, tal como la comida (si se tiene hambre), el calor (si se tiene frío) y el agua (si se tiene sed). (pág. 273)

primary sex characteristics/características sexuales primarias. Estructuras del cuerpo (ovarios, testículos y órganos sexuales externos) que posibilitan la reproducción. (pág. 216)

proactive interference/interferencia proactiva. Cuando una memoria vieja interrumpe el recuerdo de una memoria más reciente. (pág. 415)

projective tests/pruebas de proyección. Pruebas de la personalidad, tales como la Rorschach o la prueba de apercepción temática, que proveen estímulos ambiguos para provocar la proyección de los pensamientos y los sentimientos de una persona. (pág. 504)

prosocial behavior/comportamiento prosocial. Comportamiento positivo, constructivo y útil. (pág. 294)

prototype/prototipo. Ejemplo que incorpora más típicamente y de mejor manera las características principales de un concepto. (pág. 428)

pseudoscientific claim/planteamiento pseudocientífico. Cualquier afirmación que aparece científica pero no se base en la ciencia. (pág. 140)

psychoactive drug/droga psicoactiva. Sustancia química que altera las percepciones y el estado de ánimo. (pág. 157)

psychoanalysis/psicoanálisis. Teoría de la personalidad de Freud; también, técnica terapéutica que intenta proporcionar a un individuo un entendimiento de sus pensamientos y acciones por exponiendo e interpretando los motivos y conflictos inconscientes subyacentes. (págs. 9, 496, 588)

psychodynamic perspective/perspectiva psicodinámica. Concepto de la personalidad que retiene algunas de las características de la teoría freudiana (tales como la importancia de los procesos inconscientes del pensamiento), pero que es menos capaz de ver los conflictos irresueltos de la niñez como fuente del desarrollo de la personalidad. (pág. 496)

psychological disorder/trastorno psicológico. Disfunción dañina en la cual los pensamientos, sentimientos o comportamientos se juzgan como inadaptados, injustificados, perturbadores y atípicos. (pág. 534)

psychology/psicología. Estudio científico del comportamiento y los procesos mentales. (pág. 5)

psychosexual stages/etapas psicosexuales. Etapas del desarrollo de la niñez (oral, anal, fálica, latente y genital) durante las cuales, según Freud, las energías de búsqueda de placer del ello se concentran en las distintas zonas erógenas. (pág. 501)

psychotherapy/psicoterapia. Interacción entre un terapeuta calificado y alguien que está tratando de superar las dificultades psicológicas o lograr crecimiento personal. (pág. 588)

puberty/pubertad. Etapa de maduración sexual durante la cual una persona se vuelve capaz de reproducirse. (pág. 216)

punishment/castigo. Todo tipo de consecuencia que disminuye la futura probabilidad de que se produzca un comportamiento. (pág. 269)

pupil/pupila. Apertura ajustable del centro del iris; controla la cantidad de luz que entra al ojo. (pág. 102)

R

random assignment/asignación aleatoria. Asignación al azar de participantes a grupos de control y experimentales, para minimizar diferencias preexistentes entre los asignados a distintos grupos. (pág. 32)

random sample/muestra aleatoria. Muestra que representa correctamente a una población porque cada uno de los miembros tiene igual probabilidad de ser incluido. (pág. 28)

range/intervalo. Diferencia entre el puntaje más alto y el más bajo de una distribución. (pág. 47)

rapid eye movement (REM) sleep/sueño de movimientos oculares rápidos (MOR). Fase del sueño recurrente en el que generalmente ocurren los sueños vívidos. (pág. 147)

recall/recordación. Medida de la memoria que consiste en recuperar información aprendida anteriormente, tal como en las pruebas de rellenar espacios en blanco. (pág. 406)

receptor cells/células receptoras. Células que se encuentran en todo sistema sensorial y transforman (transducen) otros tipos de engergía en impulsos que el cerebro es capaz de procesar. (págs. 67, 103)

reciprocal determinism/determinismo recíproco. Influencias de la interacción entre factores de la personalidad y del ambiente. (pág. 522)

recognition/reconocimiento. Medida de la memoria que consiste en identificar cosas que se aprendieron anteriormente, tal como en una prueba de escogencia múltiple. (pág. 406)

rehearsal/ensayo. Repetición consciente de información. (pág. 392)

reinforcement/reforzamiento. Todo tipo de consecuencia que aumenta la probabilidad de que se produzca un comportamiento en el futuro. (pág. 269)

reliability/fiabilidad. Medida en la que una prueba produce resultados uniformes, sin importar quién la administra o dónde se la da. (págs. 452, 519)

replicate/replicar. Repetir un estudio científico para observar si los resultados pueden ser reproducidos de forma fiable. (pág. 35)

repression/represión. Según la teoría psicoanalítica de Sigmund Freud, proceso en el que se pasan al inconsciente los recuerdos que producen ansiedad. (pág. 417)

Rescorla, Robert (1940–). Investigador que desarrolló, junto con su colega Allan Wagner, una nueva teoría que enfatizaba la importancia de los procesos cognitivos en el condicionamiento clásico. (pág. 261)

resilience/elasticidad. Capacidad de crecer y prosperar a pesar de los desafíos y reponerse después de la adversidad. (pág. 498)

resistance/resistencia. Según el psicoanálisis, bloqueo de la consciencia de recuerdos que producen ansiedad. (pág. 589)

response/respuesta. Todo tipo de comportamiento o acción. (pág. 250)

resting potential/potencial de reposo. Estado de descanso de una neurona cuando es capaz de generar un potencial de acción. (pág. 64)

reticular formation/formación reticular. Red de fibras nerviosas en el bulbo raquídeo, que cumple un papel importante en la regulación de la vigilia y la estimulación. (pág. 82)

retina/retina. Superficie sensible a la luz que está ubicada en la parte posterior del globo ocular. (pág. 103)

retinal disparity/disparidad retiniana. Clave de profundidad binocular que resulta de la producción de imágenes ligeramente distintas por la separación de las retinas del ojo izquierdo y el derecho. (pág. 123)

retrieval/recuperación. Proceso mediante el cual se recuerda información almacenada en la memoria. (págs. 390, 411)

retroactive interference/interferencia retroactiva. Cuando un recuerdo más reciente perturba el recuerdo de una memoria mas vieja. (pág. 415)

rods/bastoncillos. Células receptoras de la visión ubicadas en la retina que detectan sólo el negro, el blanco y el gris. (pág. 104)

Rogers, Carl (1902–1987). Psicólogo humanista que elaboró la terapia centrada en el cliente y enfatizó la importancia de la aceptación, la autenticidad y la empatía para fomentar el crecimiento personal del ser humano. (págs. 10, 508, 592)

role/rol. Conjunto de expectativas en un entorno social que definen cómo se debe actuar. (pág. 317)

rooting reflex/reflejo de búsqueda. Tendencia de los bebés, cuando se les toca la mejilla, a abrir la boca y buscar el pezón. (pág. 194)

Rorschach inkblot test/prueba de Rorschach. Conjunto de diez manchas de tinta diseñado por Hermann Rorschach. Es la prueba de proyección empleada con más frecuencia y tiene el propósito de identificar los sentimientos de las personas mediante el análisis de sus interpretaciones de las manchas. (pág. 504)

S

scapegoat theory/teoría de chivo expiatorio. Teoría según la cual el prejuicio representa una vía de escape al enojo porque proporciona a alguien a quién culpar. (pág. 346)

Schachter, Stanley [SHACK-ter] (1922–1997). Psicólogo estadounidense que, junto con Jerome Singer, concluyó que las emociones requieren una identificación cognitiva de estimulación fisiológica (véase *la teoría de las emociones de dos factores*). (pág. 483)

schemas/esquemas. Conceptos de marcos mentales que ordenan e interpretan información. (pág. 198)

schizophrenia/esquizofrenia. Conjunto de trastornos graves caracterizados por pensamientos desordenados y delirantes, percepciones perturbadas y emociones y acciones inapropiadas. (pág. 574)

scientific method/método científico. Método de aprendizaje del mundo que nos rodea mediante la aplicación del pensamiento crítico y mecanismos tales como la observación, la experimentación y el análisis estadístico. (pág. 21)

secondary reinforcement/reforzamiento secundario. Se dice de algo que se ha aprendido a valorar, por ejemplo, el dinero. (pág. 273)

secondary sex characteristics/características sexuales secundarias. Características sexuales que no están directamente relacionadas con la reproducción, tales como los senos y las caderas en la mujer, el tono de voz en el hombre y el vello del cuerpo. (pág. 216)

selective attention/atención selectiva. Capacidad de enfocar la consciencia en un estímulo en particular excluyendo a los demás. (pág. 99)

self-actualization/autorrealización. Según Abraham Maslow, necesidad psicológica más importante que surge después de satisfacer las necesidades físicas y psicológicas y de lograr la autoestima; motivación de realizar el potencial personal. (págs. 468, 507)

self-concept/concepto de uno mismo. Todo lo que pensamos y sentimos acerca de nosotros mismos cuando respondemos a la pregunta: "¿Quién soy?" (pág. 508)

self-disclosure/revelación de uno mismo. Revelación a los demás de cosas que uno considera íntimas. (pág. 340)

self-fulfilling prophecy/predicción que acarrea su propio cumplimiento. Predicción que ocurre cuando las opiniones de una persona acerca de los demás hacen que uno actúe de tal manera que induce a las demás personas a parecer que confirman dichas opiniones. (pág. 331)

self-serving bias/sesgo de autoservicio. Disposición a percibirse favorablemente. (pag. 314)

Seligman, Martin (1942–). Psicólogo estadounidense que investigó la incapacidad al principio de su carrera antes de interesarse en el optimismo; ha sido el defensor principal de la psicología positiva. (págs. 525, 634)

Selye, Hans [SELL-yay] (1907–1982). Psicólogo que investigó las respuestas recurrentes al estrés y que él denominó síndrome de adaptación general. (pág. 624)

semantic encoding/codificación semántica. Codificación del significado. (pág. 394)

senile dementia/demencia senil. Desintegración mental que acompaña al alcoholismo, un tumor, un derrame cerebral, la edad y, más a menudo, la enfermedad de Alzheimer. (pág. 237)

sensation/sensación. Proceso mediante el cual los sistemas sensoriales (ojos, oídos y otros órganos sensoriales) y el sistema nervioso reciben estímulos del ambiente. (pág. 95)

sensorimotor stage/etapa sensorio motriz. Según la teoría de Piaget, etapa (desde el nacimiento hasta aproximadamente los dos años) durante la cual los niños conocen el mundo mayormente en términos de sus impresiones sensoriales y sus actividades motoras. (pág. 200)

sensory adaptation/adaptación sensorial. Disminución en la sensibilidad que resulta de la estimulación constante. (pág. 99)

sensory memory/memoria sensorial. Etapa inicial y breve de codificación de información sensorial en el sistema de la memoria. (pág. 399)

sensory nerves/nervios sensoriales. Nervios que transmiten información al sistema nervioso central. (pág. 67)

serial position effect/efecto de posición serial. Tendencia a recordar los elementos del comienzo y el fin de una lista con mayor facilidad. (pág. 393)

set point/punto fijo. Punto en el que se supone que está puesto el "medidor de peso" de un individuo. Cuando el cuerpo baja de ese peso, es posible que aumente el hambre y disminuya el metabolismo para recuperar el peso perdido. (págs. 473, 649)

sexual orientation/orientación sexual. Atracción sexual duradera hacia miembros del mismo sexo (orientación homosexual) o del sexo opuesto (orientación heterosexual). (pág. 217)

shaping/modelamiento. Reforzamiento de comportamientos que son cada vez más similares al que uno desea que ocurra. Es la técnica del condicionamiento operante que se emplea para establecer nuevos comportamientos. (pág. 277)

short-term memory/memoria inmediata. Memoria consciente y activada que retiene brevemente unos siete trozos de información antes de que ésta sea almacenada más permanentemente o se olvide. (pág. 399)

signal detection theory/teoría de la detección de señales. Conjunto de fórmulas y principios que predicen cuándo detectaremos la presencia de un estímulo leve ("señal") entre la estimulación de fondo ("ruido"). La detección depende de las características del estímulo, el ambiente y la persona que realiza la detección. (pág. 98)

skewed/asimétrico. Distorsionado; que no está distribuido uniformemente alrededor de la media. (pág. 46)

Skinner, B. F. (1904–1990). Psicólogo estadounidense que desarrolló los principios fundamentales y las técnicas del condicionamiento operante y creó maneras de aplicarlos en situaciones reales. Sostuvo que los niños aprenden el lenguaje a través de las asociaciones, la imitación y el reforzamiento. (págs. 10, 268, 302)

sleep apnea/apnea del sueño. Trastorno del sueño en el que se interrumpe temporalmente la respiración, lo cual hace que la persona se despierte por momentos. (pág. 151)

social clock/reloj social. Momento apropiado, según la preferencia cultural, para eventos sociales tales como el matrimonio, la crianza de los hijos y el retiro laboral. (pág. 232)

social facilitation/facilitación social. La mejoración en la ejecución de tareas ante la presencia de otras personas. (pág. 327)

social influence theory/teoría de influencia social. Teoría que propone que las influencias sociales de gran impacto son capaces de producir un estado hipnótico. (pág. 178)

social loafing/disminución de productividad en un grupo. Tendencia de las personas de un grupo a esforzarse menos cuando aportan su esfuerzo para el logro de una meta común, que cuando son responsables de manera independiente. (pág. 328)

social psychology/psicología social. Estudio científico que observa cómo nos relacionamos con los demás, los influenciamos y pensamos en ellos. (pág. 311)

social-cognitive perspective/perspectiva cognitivo-social. Perspectiva según la cual el entendimiento de la personalidad se basa en considerar cómo las personas se ven afectadas por una situación, por lo que han aprendido, por lo que piensan y por la forma en que interactúan socialmente. (pág. 513)

social-cultural perspective/perspectiva sociocultural. Corriente de pensamiento que se centra en cómo el pensamiento o comportamiento cambia en distintas situaciones o como resultado de las influencias culturales. (pág. 15)

somatic nervous system/sistema nervioso somático. Subdivisión del sistema nervioso periférico que controla los músculos esqueléticos del cuerpo. (pág. 71)

somatoform disorders/trastornos somatoformes. Trastornos psicológicos cuyos síntomas se expresan de forma somática (del cuerpo) sin causa física aparente. (pág. 573)

somatosensory cortex/corteza somatosensorial. Parte cerebral ubicada delante de los lóbulos parietales que registra y procesa las sensaciones del cuerpo. (pág. 87)

somnambulism/sonambulismo. Caminar dormido, lo cual generalmente comienza en las etapas de sueño NREM más profundo. La persona sonámbula es capaz de caminar, de hablar y también de ver, pero pocas veces recuerda esos episodios. (pág. 153)

standard deviation/desviación estándar. Medida calculada de cuántos puntajes varían alrededor del puntaje de la media. (pág. 47)

state-dependent memory/memoria dependiente del estado. Capacidad potenciada de recuperar información cuando uno está en el mismo estado físico y emocional que estaba cuando se codificó esa información. (pág. 408)

statistical significance/significación estadística. Afirmación estadística que indica la probabilidad de que un resultado ocurra solamente por pura casualidad. (pág. 53)

stereotype/estereotipo. Creencia generalizadora (a veces acertada, pero a menudo demasiado generalizadora) acerca de un grupo de personas. (pág. 344)

Sternberg, Robert (1949–). Autor de una teoría contemporánea de inteligencias múltiples que distingue entre la inteligencia analítica, la creativa y la práctica. (pág. 441)

stimulants/estimulantes. Drogas (tales como la cafeína, la nicotina y otras más potentes como las anfetaminas y la cocaína) que estimulan la actividad nerviosa y aceleran las funciones del cuerpo. (pág. 163)

stimulus/estímulo. Cualquier cosa del ambiente a lo que uno es capaz de responder. (pág. 250)

storage/almacenamiento. Retención de información codificada a lo largo del tiempo. (págs. 390, 411)

stranger anxiety/ansiedad ante los extraños. Miedo a personas desconocidas que se presenta comúnmente en los bebés y que comienza aproximadamente a los ocho meses de vida. (pág. 204)

stress/estrés. Proceso mediante el cual percibimos y respondemos a ciertos sucesos estresantes, que calificamos como amenazantes o desafiantes. (pág. 622)

structuralism/estructuralismo. Teoría que la estructura de la experiencia consciente puede ser entendida mediante el análisis de los elementos básicos de los pensamientos y las sensaciones. (pág. 7)

superego/superyó. Según Freud, componente de la personalidad que representa ideales internalizados y proporciona parámetros de juicio (el consciente) y de aspiraciones futuras. (pág. 499)

superordinate goals/metas superiores. Metas compartidas que anulan las diferencias entre individuos y requieren de su colaboración. (pág. 352)

survey method/método de estudio o **encuesta.** Técnica de investigación diseñada para descubrir actitudes o comportamientos. Muestras de personas ofrecen sus comunicados voluntariamente mediante cuestionarios o entrevistas. (pág. 27)

sympathetic division/división simpática. Parte del sistema nervioso autónomo que estimula el cuerpo para responder a situaciones que se perciben como amenazas. (pág. 72)

synapse [SIN-aps]/sinapsis. El pequeño espacio lleno de líquido entre el extremo del axón de una neurona y la dendrita de otra. (pág. 65)

systematic desensitization/desensibilización sistemática. Tipo de contracondicionamiento en el cual se asocia un estado tranquilo y agradable con estímulos que provocan ansiedad y que se aplican de manera gradual y en aumento. (pág. 595)

T

temperament/temperamento. Reacción e intensidad emocional características de un individuo. (pág. 195)

temporal lobes/lóbulos temporales. Porción de la corteza cerebral ubicada más o menos encima de las orejas; incluye las áreas auditivas (del oído). (pág. 86)

teratogens/teratógenos. Sustancias que penetran la barrera placentaria e impiden el desarrollo normal del feto. (pág. 193)

Terman, Lewis (1877–1956). Adaptó las pruebas de Binet para su uso en los Estados Unidos en una prueba de inteligencia que reportó la inteligencia con un puntaje calculado de coeficiente intelectual (CI). (pág. 444)

thalamus [THAL-uh-muss]/tálamo. Tablero de control sensorial del cerebro, ubicado encima del tronco cerebral; dirige mensajes a las áreas de la corteza cerebral que reciben mensajes sensoriales. (pág. 82)

Thematic Apperception Test (TAT)/Prueba de apercepción temática. Prueba de proyección en la cual las personas expresan sus sentimientos e intereses a través de cuentos que inventan basándose en escenas ambiguas. (pág. 504)

Thorndike, Edward (1874–1949). Creador de la ley del efecto, principio que forma la base del condicionamiento operante. (pág. 268)

Titchener, Edward. B. (1867–1927). Fundador del estructuralismo. (pág. 7)

token economy/economía de fichas. Procedimiento del condicionamiento operante que intenta modificar el comportamiento dando recompensas por los comportamientos deseables. (pág. 598)

tolerance/tolerancia. Receptividad reducida a una sustancia, que da lugar a que la persona aumente la dosis para sentir los efectos que anteriormente obtenía con dosis más pequeñas. (pág. 158)

top-down processing/procesamiento de arriba hacia abajo. Procesamiento de información que enfatiza nuestras expectativas y experiencias cuando interpretamos la información sensorial que recibimos. (pág. 96)

trait/rasgo. Aspectos de la personalidad que son relativamente uniforme. (pág. 513)

transference/transferencia. En el psicoanálisis, transferencia del paciente al analista de emociones (tales como amor u odio) que están ligadas a otras relaciones. (pág. 589)

trichromatic theory/teoría tricromática. Teoría de la visión del color que plantea que los conos están "calibrados" para detectar la luz roja, verde o azul. En estos tipos de conos existen varios niveles de estimulación que nos permiten identificar millones de combinaciones de colores distintas. (pág. 105)

two-factor theory/teoría de las emociones de dos factores. Teoría que propone que para experimentar emociones debe existir estimulación física y identificarse el estímulo a nivel cognitivo. (pág. 483)

Type A/tipo A. Término que se refiere a los individuos competidores, luchadores, impacientes, agresivos verbalmente y propensos al enojo. (pág. 630)

Type B/tipo B. Término que se refiere a los individuos de trato fácil y tranquilos. (pág. 630)

U

ultradian (ul-TRAY-dee-un) rhythms/ritmos ultradianos. Ritmos biológicos que ocurren más de una vez al día. (pág. 141)

unconditional positive regard/estima positiva incondicional. Según la teoría de Carl Rogers, actitud de aceptación total hacia otra persona. (pág. 508)

unconditioned response (UR)/respuesta incondicionada. En el condicionamiento clásico, respuesta automática al estímulo no condicionado. (pág. 251)

unconditioned stimulus (US)/estímulo incondicionado. En el condicionamiento clásico, estímulo que provoca una respuesta automática y reflexivamente. (pág. 251)

unconscious/inconsciente. Según Freud, región de la mente que actúa como reserva de pensamientos, deseos, sentimientos y recuerdos mayormente inaceptables. (pág. 497)

V

validity/validez. Punto hasta el cual una prueba mide o predice lo que se supone provar. (págs. 452, 519)

variable-interval schedule/programa de intervalos variables. En el condicionamiento operante, programa de reforzamiento parcial que administra recompensas por la primera respuesta correcta después de una cantidad de tiempo impredecible. (pág. 280)

variable-ratio schedule/programa de proporción variable. En el condicionamiento operante, programa de reforzamiento parcial que administra recompensas por un número impredecible de respuestas correctas. (pág. 281)

vestibular sense/sentido vestibular. Sistema que percibe la orientación y el equilibrio del cuerpo y está ubicado en los canales semicirculares del oído interno. (pág. 115)

vicarious learning/aprendizaje vicario. Aprendizaje por observar las consecuencias del comportamiento de otra persona. (pág. 291)

virtual reality exposure therapy/terapia de exposición mediante realidad virtual. Un tratamiento para la ansiedad que progresivamente expone a las personas a simulaciones de sus temores más grandes, como volar en avión, las arañas o hablar en público. (pág. 596)

visual cliff/precipicio visual. Aparato de laboratorio que examina la percepción de profundidad de los bebés recién nacidos y de los animales jóvenes. (pág. 122)

W

Watson, John B. (1878–1958). Fundador del conductismo, perspectiva según la cual la psicología debe limitarse a estudiar los comportamientos observables y no los procesos mentales. (págs. 10, 257)

Wechsler, David (1896–1981). Creador de las pruebas individuales de inteligencia que más se administran en los Estados Unidos. Fueron las primeras pruebas en tener puntajes tanto para la inteligencia verbal como para la de desempeño. (pág. 446)

wellness/bienestar. Resultado de un estilo de vida y actitudes saludables. (pág. 635)

Wernicke's [VER-nik-ees] area/área de Wernicke. Parte del cerebro ubicada en el lóbulo temporal izquierdo que participa en la comprensión y la expresión del lenguaje. (pág. 89)

withdrawal/síntomas de abstinencia. Malestar y angustia que ocurren a una persona que depende de una droga adictiva cuando deja de consumirla. (pág. 158)

Wundt, Wilhelm [VOONT] (1832–1920). Fundador de la psicología moderna; abrió el primer laboratorio de psicología. (pág. 6)

Y

Yerkes-Dodson law/ley de Yerkes-Dodson. Teoría según la cual un grado de estimulación psicológica facilita el rendimiento, pero sólo hasta cierto punto. (pág. 464)

Z

Zajonc, Robert [ZI-yence] (1923–2008). Psicólogo estadounidense que concluyó que algunas reacciones emocionales no requieren un pensamiento intencionado y que la cognición no siempre es necesaria para la emocion. (pág. 483)

Zimbardo, Philip (1933–). Psicólogo estadounidense cuyas investigaciónes se centran en el heroísmo, los comportamientos de los cultos y la timidez. Es más famoso por el estudio de la prisión de Stanford. (pág. 318)

zygote/cigoto. Óvulo fecundado. (pág. 192)

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